FACT SHEET FOR FRESH FRUIT PACKING GENERAL PERMIT

ISSUED JUNE 15, 1999
EFFECTIVE JULY 1, 1999 EXPIRATION JULY 1, 2004

SUMMARY

The State of Washington Department of Ecology (Department) has tentatively determined to reissue a general permit to the fresh fruit packing industry operating in the State of Washington (State) outlining those discharges which will be subject to certain treatment/disposal methods (TDMs) and effluent limitations. The fresh fruit packing industry has a duty to comply with all of the limitations and TDMs. This may require the installation of industrial pretreatment facilities, best management practices (BMPs), or other conditions deemed necessary by the Department to carry out the provisions of State and Federal law. The proposed terms, limitations and conditions contained herein are tentative and may be subject to change, subsequent to public hearings. All facilities accepted under the general permit will not be relieved of any responsibility or liability at any time during the life of the permit for: (1) violating or exceeding State water quality standards; or (2) violating any other local, State, or Federal regulation or standard as may pertain to the individual facility. All facilities not accepted under the general permit will be required to apply for an individual permit. Any fresh fruit packing facility found not covered under either the general permit or an individual permit will be considered to be operating without a discharge permit and subject to potential enforcement action.

PUBLIC COMMENT AND INFORMATION

A Public Notice of Draft (PNOD) was published in the State Register and 2 newspapers (the Yakima Herald-Republic and Wenatchee World) on February 17, 1999. Two (2) public hearings on the draft Fresh Fruit Packing General Permit were held at least thirty (30) days after the date of the public notice. The first hearing was held in the city of Yakima at the Department of Ecology Central Regional Office at 15 West Yakima Avenue on March 23, 1999 at 4 p.m. The second hearing was held in the city of Wenatchee at the Wenatchee Public Library on March 25 at 4 p.m. A one hour workshop to explain proposed changes and answer questions was held immediately preceding both hearings.

Interested persons were invited to submit comments regarding the proposed reissuance of the Fresh Fruit Packing General Permit. Comments on the general permit may have been given at the public hearings as either written or oral testimony. Written comments may also have been submitted to the Ecology Central Regional Office at the address below:

Washington State Department of Ecology
Central Regional Office
Attention: General Permits Manager
15 West Yakima Avenue, Suite 200
Yakima, Washington 98902

All comments must have been submitted by 5 p.m. on March 30, 1999 (within 40 days of the date of publication of the PNOD) to be considered in the final permit determination. A

responsiveness summary was prepared and available for public review. It also was sent to all parties who submitted comments by the March 30, 1999 deadline.

The final determination on the general permit remained substantially unchanged from that published in the public notice. A Public Notice of Issuance (PNOI) was published on May 5, 1999 and was also sent to all permittees, interested parties, and persons who submitted written comment or gave public testimony regarding the permit. Since the final determination was substantially unchanged, a second PNOD was not needed.

The permit was issued on June 15, 1999 and will become effective on July 1, 1999.

The proposed and final general permit, fact sheet, application form, and other related documents are on file and may be inspected and copied between the hours of 8:00 a.m. and 4:30 p.m., weekdays at the following Department locations:

Washington State Department of Ecology
Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, WA 98902
(509) 454-7298
TDD (509) 454-7673
FAX (509) 575-2809
Contact: Steven Huber

Washington State Department of Ecology
Eastern Regional Office
North 4601 Monroe, Suite 202
Spokane, WA 99205
(509) 456-2874
TDD (509) 458-2055
FAX (509) 456-6175
Contact: Mike Huffman

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INTRODUCTION

This fact sheet is a companion document designed to provide the basis for reissuance of the Fresh Fruit Packing General National Pollutant Discharge Elimination System (NPDES) and State Waste Discharge (SWD) Permit. This general permit was originally issued on February 10, 1994. The Department of Ecology (the Department) is proposing to reissue this permit, which will allow discharge of wastewater from the fresh fruit packing industry to waters of the State of Washington, pursuant to the provisions of chapters 90.48, 90.52, and 90.54 Revised Code of Washington (RCW) and the Federal Water Pollution Control Act (FWPCA) as amended. This fact sheet explains the nature of the proposed discharges, the Department's decisions on limiting the pollutants in the wastewater, and the regulatory and technical basis for these decisions.

The Federal Clean Water Act (FCWA, 1972, and later modifications (1977, 1981, and 1987), established water quality goals for the navigable (surface) waters of the United States. One of the mechanisms for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System of permits (NPDES permits), which is administered by the Environmental Protection Agency (EPA). The EPA has delegated responsibility to administer the NPDES permit program to the State of Washington on the basis of Chapter 90.48 RCW which defines the Department of Ecology's authority and obligations in administering the wastewater discharge permit program.

The establishment of a general permit for the fruit packing industry is logical due to: (1) the similar wastewater characteristics among facilities, (2) the uniform discharge conditions to which all facilities would be subject, and (3) the significant reduction of resources necessary for permit handling. However, individual permits will still be applied in those instances where a facility requires more detailed guidance, or when an individual packer so desires and the Department approves.

The regulations adopted by the State include procedures for issuing general permits (Chapter 173-226 WAC), water quality criteria for surface and ground waters (Chapters 173-201A and 200 WAC), and sediment management standards (Chapter 173-204 WAC). These regulations require that a permit be issued before discharge of wastewater to waters of the state is allowed. The regulations also establish the basis for effluent limitations and other requirements which are to be included in the permit. One of the requirements (WAC 173-226-110) for issuing a permit under the NPDES permit program is the preparation of a draft permit and an accompanying fact sheet. Public notice of the draft permit, public hearings, comment periods, and public notice of issuance are all required before the general permit is issued (WAC 173-226-130). The fact sheet and draft permit are available for review (see Appendix A--Public Involvement of the fact sheet for more detail on the Public Notice procedures).

The fact sheet and draft permit have been reviewed by representatives of the industry. Errors and omissions identified in this review have been corrected before going to public notice. After the public comment period has closed, the Department will summarize the substantive comments and the response to each comment. The summary and response to comments will become part of the file on the permit and parties submitting comments will receive a copy of the Department's response. The fact sheet will not be revised after the public notice is published. Comments and the resultant changes to the permit will be summarized in Appendix D--Response to Comments.

BACKGROUND INFORMATION

WATER QUALITY PROTECTION REQUIREMENTS

Sections 301, 302, 306, and 307 of the FWPCA established discharge standards, prohibitions, and limits based on pollution control technologies. These technology-based limits are "best practical control technology" (BPT), "best available technology economically achievable" (BAT), and "best conventional pollutant control technology economically achievable" (BCT). Compliance with BPT/BAT/BCT may be established using a "best professional judgement" (BPJ) determination.

The State has similar technology-based limits which are described as: "all known, available and reasonable treatment" (AKART) methods. AKART is referred to in State law under RCW 90.48.010, RCW 90.48.520, 90.52.040 and RCW 90.54.020. The Federal technology-based limits and AKART are similar but not equivalent. AKART: (1) may be established for an industrial category or on a case-by-case basis; (2) may be more stringent than Federal regulations; and (3) includes not only treatment, but also BMPs such as prevention and control methods (i.e. waste minimization, waste/source reduction, or reduction in total contaminant releases to the environment). The Department and the Federal Environmental Protection Agency (EPA) concur that, historically, most discharge permits have determined AKART as equivalent to BPJ determinations. The proposed BMPs, limitations and prohibitions, obtained by BPJ determinations, for this Fresh Fruit Packing General Permit are substantially similar to those established by the State of Michigan to regulate its fresh fruit packing industry.

RCW 90.48.035 authorizes establishment of water quality standards for waters of the State. The State has implemented ground water quality standards in chapter 173-200 State of Washington Administrative Code (WAC). The State has also implemented surface water quality standards in chapter 173-201A WAC. All waste discharge permits, whether issued pursuant to NPDES or SWD regulations: (1) are anticipated to prevent damage to waters of the State, and (2) are conditioned in such a manner that all authorized discharges shall meet State water quality standards. All those standards include an "antidegradation" policy which stipulates that existing quality and beneficial uses shall be protected. Implementation of the surface water antidegradation policy is discussed in more detail starting on page 62.

Discharges from the fresh fruit packing industry may contain pollutants which, in excessive amounts, have a reasonable potential to cause, or contribute to, violations of State water quality due to the presence of total dissolved solids, chlorine, turbidity, oxygen demand, high temperature, high or low pH, or toxic materials. The Department has tentatively determined that, when properly treated and disposed of in accordance with the terms and conditions of the general permit, fresh fruit packing discharges: (1) will not allow permit backsliding; (2) will comply with State water quality standards; (3) will protect POTW facilities and by-products; (4) will maintain and protect the existing characteristic beneficial uses of the waters of the State; and (5) will protect human health. Protection of aquatic life by conditions in the general permit is assumed to

protect human health. New information regarding human health risks may cause reopening of the general permit.

RECEIVING WATER IDENTIFICATION

The activities of the Fresh Fruit Packing General Permit applicants may potentially affect both surface and ground waters of the State. These waters are protected by chapter 173-201A WAC, Water Quality Standards for Surface Waters of the State of Washington, and chapter 173-200 WAC, Water Quality Standards for Ground Waters of the State of Washington. The purpose of these standards is to establish the highest quality of State waters, through the reduction or elimination of contaminant discharges to the waters of the State, consistent with: public health; public enjoyment; the propagation and protection of fish, shellfish, and wildlife; and existing and future beneficial uses. This purpose is reached, in part, by the fresh fruit packing industry compliance with the limitations, terms and conditions of the Fresh Fruit Packing General Permit.

The small percentage of fresh fruit packing facilities which discharge, directly or indirectly, to surface waters shall be required to meet, at a minimum, all the State water quality standards for Class A surface waters as given in chapter 173-201A WAC. Surface waters which may receive discharges from the fresh fruit packing industry include both Class AA and Class A waters. One example of Class AA waters which may be affected includes that section of the Wenatchee River from the Wenatchee National Forest boundary (river mile 27.1) to the headwaters. Examples of Class A waters which may be affected include, but are not limited to, major sections of the Columbia, Naches, Okanogan, Wenatchee, and Yakima Rivers. In addition, all surface waters not specifically categorized in chapter 173-201A WAC will be automatically judged to be Class A, unless they are tributary to Class AA surface waters. These Class AA tributary surface waters shall be considered Class AA themselves. The characteristic beneficial uses of Class AA and A surface waters include, but are not limited to, the following: domestic, industrial and agricultural water supply; stock watering; the spawning, rearing, migration and harvesting of fish; the spawning, rearing and harvesting of shellfish; wildlife habitat; recreation (primary contact, sport fishing, boating, aesthetic enjoyment of nature); commerce and navigation.

The larger percentage of fresh fruit packing facilities which discharge, directly or indirectly, to ground waters shall be required to meet, at a minimum, all the State water quality standards as given in chapter 173-200 WAC. Ground waters which may receive discharges from the fresh fruit packing industry generally have a high background quality and no significant or substantial chemical change is allowed.

For discharges which contain complex synthetic chemicals, the ground water standards mean that no significant change is allowed above background water quality. A significant change occurs when a contaminant level increases above background water quality levels when using the lowest quantifiable analytical method. For discharges which contain other chemicals, the ground water standards mean that no substantial change of background water quality, or exceedance of any listed chemical criterion, is allowed. A substantial change occurs when a chemical contaminant level increases above background water quality by at least 50%.

WATER SOURCES

The fresh water utilized by the fresh fruit packing industry is obtained from municipal purveyors, reservoirs, surface water (such as the Columbia River), or ground water (wells). The amount of water consumed during packing operations varies depending upon the following: facility size, operating policies, type of the cooling water system, water cost and availability, and even the condition of the harvested fruit. However, those fresh fruit packers utilizing a presize scheme typically use larger amounts of fresh water than those not using a presize scheme. This increase in water use is due primarily to the flumes, as well as some duplication of process units (washes and rinses).

DESCRIPTION OF THE FRUIT PACKING INDUSTRY

Geographical Area Of Coverage

For the purposes of the general permit, the State's fresh fruit packing industry shall be defined as those commercial facilities which receive, pack, store, and/or ship either hard or soft fruit. Although, the industry is primarily located in the State's centralized fruit growing region along the Columbia, Yakima, Wenatchee, and Okanogan Rivers, the geographical area for which the general permit is valid includes the entire State. This fact sheet will primarily discuss apple and pear packers; however, some information may also relate and apply to the packing of other fruit, especially stone fruit, since they are typically packed at the same facilities. Any differences, relative to varying fruit types, in packing operations and methods will be noted where appropriate.

History

The State is a nationally recognized leader in fruit production which accounted for 52.7% of apples, 44.8% of sweet cherries, and 37.9% of pears grown in the U.S. in 1996. The State's 1996 overall fruit crop returned $1.25 billion in revenue. The fruit packing industry is responsible for preparing, storing, and packing any fruit production which is not immediately processed. The State's primary fruit products are apples and pears, both hard fruits[1], with their respective 1996 productions being 2,750,000 and 300,000 tons. Soft fruit 1996 production tonnages include: grapes (144,000), cherries (69,000), peaches (5500), prunes (6000), and apricots (3500). Berries and plums are also minor soft fruit productions.

Improvements in post-harvest packing and shipping methods are helping to increase world demand and allow the State to remain competitive with other major fresh fruit supplying countries such as New Zealand and Chile. International markets are extremely important to the health and stability of Washington’s fresh fruit industry. Washington producers have enjoyed long term relationships with customers in Pacific Rim countries such as Japan, Taiwan, Thailand, and Indonesia. Other countries importing significant quantities of Washington fruit products include Mexico, Canada, Saudia Arabia, and Brazil.

In the past, fresh fruit packers typically concentrated mainly on the disposal of wastewater to sites such as drainfields, dry wells, ditches, bin storage lots, unlined ponds/lagoons, land

application sites, both private (on-site) and municipal domestic sewage treatment facilities, and surface waters. Those industrial disposal practices posed potential contamination problems to the State's ground and surface water supplies, and in some cases caused substantial upsets at publicly owned treatment plants (POTW's).

An important goal of the first permit cycle was to introduce the concept wastewater treatment, in conjunction with disposal. A significant reduction in the discharge of fresh fruit packing pollutants to waters of the State can be achieved by using proper BMPs, which include alternative process wastewater Treatment / Disposal Methods (TDMs). While many fresh fruit packers were already using proper TDMs (i.e. lined evaporative lagoons, land application) and/or alternative in-house process technologies (i.e. ozonation), some of the fresh fruit packing industry's disposal practices at that time were not adequate to meet the terms and conditions of the general permit which had been developed to protect the quality of State waters. The first general permit cycle was used to identify the acceptable BMPs and alternative TDMs for the fresh fruit packing industry's wastewater discharges and to set a compliance deadline of July 31, 1996 to implement these BMPs and TDMs.

One area that merits further investigation by the industry is the ideology of integrated fruit production (IFP). Some fresh fruit packers are incorporating IFP into their operations. IFP, which has been pursued in Europe for the past 30 years, is concerned with environmental, worker safety, and public demand aspects for food containing lower residual concentrations of chemicals. IFP generally means that fewer chemicals are used at every point of the fresh fruit industry, from tree planting through fruit marketing. Proper implementation of this ideology through application of some relatively simple techniques, such as fastidious sanitation, may result in the elimination of some post-harvest fungicide applications.

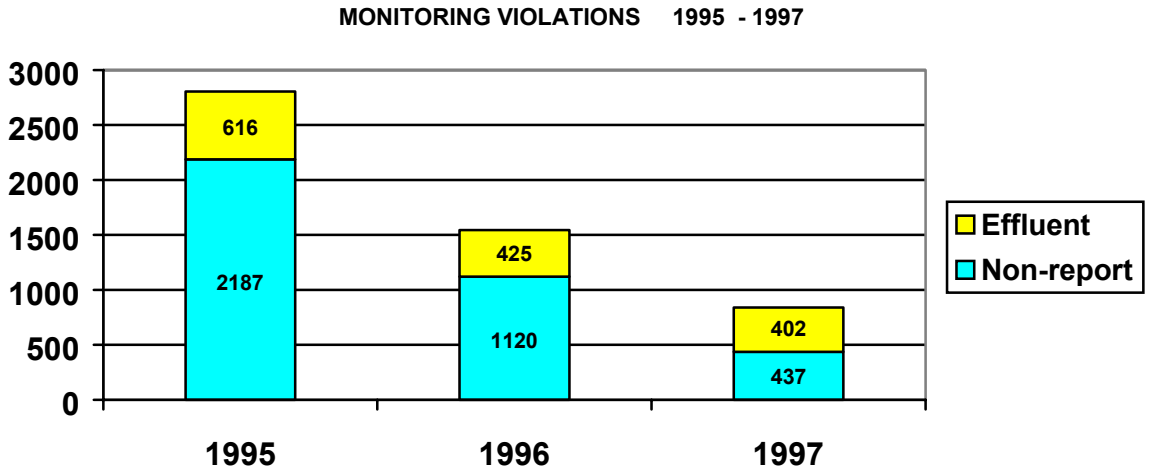
Compliance With Previous Permit

Permit compliance consists of 2 parts: 1) submittal compliance, which is turning reports in on time and 2) monitoring compliance, which is testing the wastewater to see if it is in compliance with the permit effluent limits. Overall there was a significant improvement in submittal compliance in 1997. Sixty-five percent of the 1997 Yearly Facility Reports were on time, and 82% were in within one week of the deadline. This is up from 70% in 1996. The submittal of monthly Discharge Monitoring Reports for surface water discharges also showed improvement. While there are no trends on who is late, there appear to be more late reports during the summer slack season or just after harvest begins when things get busy. It is important that facilities set up a regular routine so even during slack or busy times the reports get done.

Monitoring compliance includes both non-reporting violations, which is not doing a required test, and effluent violations, which is an actual exceedance of the permit effluent limit. The total number of monitoring violations, both effluent and non-reporting, has decreased in each of the last 2 years. In 1995 there were 2803 total violations. In 1996 the total dropped 45% to 1545 and in 1997 there another 45% drop to 839.

A substantial portion of this improvement has been due to the reduction in non-reporting violations. However, there are still some opportunities for reducing these violations further. Almost one-half of the non-reporting violations in 1997 were for Flow and pH. Both of these parameters can be determined by the facility and both are required for every wastewater sample.

While there was only a small decrease in actual effluent limit violations in 1997, the large drop in non-reporting violations means that there was a proportional improvement in the effluent limit violations. Once again there are some opportunities for reducing the number of effluent limit violations. Total Residual Chlorine and pH account for 20% of the violations. Both can be done by the facility and are controllable through process adjustment. Total Suspended Solids represent 15% of the violations and can usually be dealt with effectively with known technologies such as filters, screens, and sedimentation basins. Other types of violations are more site specific and must be dealt with on a case-by-case basis.



Wastewater Characterization

A survey was conducted during 1989 and 1990 to identify the chemicals used in the fruit packing industry (presented in Table 2). The five (5) most utilized chemicals were: DPA, TBZ, sodium orthophenylphenate (SOPP), ligninsulfonate (aka: lignosulfonate), and chlorine-based disinfectants. An EPA study on wastewater contamination by pre-harvest chemical carry-over found no detectable trace of fifty (50) different pre-harvest pesticides and herbicides in float solution effluent of fruit taken from CA storage[5]. Chemical usage is process area specific, and therefore, an analysis of individual process areas can be used to determine the appropriate BMPs for wastewater treatment/disposal.

Permit Status

This general permit was originally issued on February 10, 1994. It established six (6) Treatment / Disposal Methods (TDM) along with allowed discharges, effluent limits, and best management practices specific to each TDM. Those TDMs are: 1) lined evaporative lagoons, 2) dust abatement, 3) POTW, 4) land application, 5) percolation systems, and 6) surface waters. Application forms for renewal of coverage under the general permit were mailed to all Permittees on June 30, 1998. Completed forms should have been submitted to the department by September 8, 1998.

INDUSTRIAL PROCESSES

General operations

Industrial fresh fruit packing operations vary with the individual packer, customer preference, and the type/variety of fruit being processed; although, the characteristics of discharged wastewater are quite similar. Fruit packing was historically seasonal, coinciding with the fruit harvest season which generally begins in June (cherries) and ends in November (apples). However, with the advent of controlled atmosphere (CA) storage, the packing of apples has become a nearly year long activity.

Specifically, apples when freshly picked are first collected in wooden or plastic bins each containing approximately 25 boxes. These bins are subsequently stacked and trucked to warehouse facilities for final preparation, packing, and storage. Upon arrival at the packing warehouses, the apples will be handled in one of three ways: (1) immediately processed, (2) put into regular cold rooms (refrigeration only) for short-term storage, or (3) placed in controlled atmosphere (CA) rooms for intermediate or long-term storage after first being treated with antioxidants/fungicides. The stored apples are removed, as needed, from storage and washed, waxed, packaged and shipped to market.

In the process of CA storage, the apples are placed in a sealed warehouse, wherein the internal temperature is rapidly reduced to near 32 degrees. Simultaneously, the atmospheric oxygen content is reduced to as low as practical (generally less than 3%) by replacement with nitrogen gas. Recently, it also has been discovered that a high humidity (90-95%) is advantageous during

storage for maintaining quality. This type of storage has enabled the industry to maintain a high-quality marketable product throughout the entire year. This is in significant contrast to those apples held in regular cold storage which are marketable only for a few months following harvest, usually until January or February. The predominant industrial fresh fruit packing chemical products used include: antioxidants, disinfectants, biocides, fungicides, waxes, and cleaners.

The process of storing fruit, in either CA or regular cold storage, requires substantial cooling capabilities. There are various cooling systems possible (i.e. freon, ammonia phase change) with most using at least some water for defrosting purposes. The fresh fruit packing industry has trended toward evaporative cooling systems in which water is recirculated through tall towers where captured heat energy is released through evaporation. Although these systems effectively reduce overall water consumption, recirculation of water can lead to "fouling" of the towers. Fouling is characterized by two principal occurrences: (1) chemical scale (calcium and magnesium salts) formation and (2) physical blockages (suspended solids, corrosion products, and microbial growth). These principal fouling problems are typically controlled by regular treatments with chemical products, some of which display toxic properties.

The utilization of both CA storage and evaporative cooling tower methods has significantly increased the marketability of fruit throughout the entire year. These same methods, however, involve the use of chemical additives, some of which have a significant potential to be discharged as waste into the environment and may result in the degradation of surface and ground water quality. The development, issuance, and compliance with the Fresh Fruit Packing General Permit are anticipated to protect the waters of the State.

The fresh fruit packing industry's wastewater typically originates from seven different process areas: drencher, float tank, flumes (presized schemes only), packing lines (wash/rinse/wax) and cleanup, non-contact cooling water, sanitary sewage, and stormwater. These wastewaters are characterized below:

Post-Harvest/Pre-Packing Processes - Drenchers

Fresh fruit picked in the orchards must be either immediately processed or go into storage (either CA or regular cold storage) for later shipment to market. During storage, fruit are susceptible to several post-harvest diseases and disorders. The most common ***diseases*** are: (1) Gray Mold, *Botrytis*, which enters through the calyx and wounds in the skin at the field site; (2) Blue Mold, *Penicillium*, which enters through wounds or bruises during storage; (3) Bull's Eye Rot, which is a rot established on the fruit in the orchard; and (4) Mucor Rot, which is a soil-borne fungus that grows well at cold storage temperatures. The most common ***disorders*** are: (1) Scald, which is a brown discoloration of the skin caused by oxidation; and (2) Bitter Pit, another degradation of the fruit flesh. A summary and description of each of these common diseases and disorders can be found on page 23 in Good Fruit Grower, Vol. 41, No. 6, March 15, 1990.

In order to eliminate the transmission of such diseases and the occurrence of disorders, the fresh fruit packing industry relies on various chemical treatments. Typically, the first application of a post-harvest chemical is accomplished at the "drencher", immediately prior to the fruit being

placed in CA storage. Upon leaving CA storage, the fruit are subjected to another chemical treatment in the "float" tank where they are floated out of their storage containers. Finally, they are washed, rinsed, waxed, dried, packaged, and held in regular cold storage for ultimate shipment to market.

Typically, the red (and sometimes golden) varieties of apples are drenched with a solution containing the antioxidant diphenylamine (DPA) combined with a fungicidal chemical such as thiabendazole (TBZ), prior to CA storage. DPA is used to combat the most important post-harvest apple disorder, scald[4], while TBZ is used to reduce postharvest decay. In addition, calcium chloride is sometimes used as a post harvest drench to prevent disorders, such as bitter pit in Granny Smith, Golden Delicious, Braeburn, and other varieties of apples which are susceptible to these disorders. Calcium chloride is used alone or in conjunction with DPA and TBZ. Pears, another hard fruit, may be drenched with an Ethoxyquin® solution. Soft fruits such as peaches, apricots, nectarines and plums (stone fruit) are not typically drenched before storage. Other soft fruit, such as prunes and berries, never use any drench solution and are packed "dry". Still others, such as cherries and some varieties of pears, are not truly "drenched" but are rather "hydrocooled" which usually involves drenching in cold water containing chorine or some other fungicide.

Drencher wastewater normally contains high concentrations of the antioxidants DPA (for apples) and Ethoxyquin® (for pears), and the fungicide TBZ (for apples and pears). Miscellaneous solid orchard waste residuals such as soil, leaves and twigs are usually present in the drencher wastewater. Since the fungicides adhere strongly to soil particles, they may potentially accumulate in any resultant sludge. However, sludge analysis data, provided to the Department's Solid and Dangerous Waste Section, indicated that drencher sludge did not designate as dangerous waste. The Department's booklet entitled A Guide for Fruit Packing Warehouses: How to Properly Manage and Reduce Your Pesticide Hazardous Wastes may be used to easily classify any fresh fruit packing wastestream as to whether it qualifies as a dangerous waste. Calcium chloride is used at concentrations which pose a potential for salt build-up in the soil and eventual leaching to groundwater. This permit will specify application rates which should be protective of groundwater quality. Another possible optional drencher additive is a food grade silicone defoaming agent, which is not considered environmentally detrimental at the concentrations typically used by the fresh fruit packing industry.

Drenching may be accomplished by either of two methods: truck-drenching or bin-drenching. These two methods are typically utilized by those packers which process more than or less than 50,000 bins per year, respectively. In **truck-drenching,** the drench solution is applied to the fruit while still in bins on the truck. A typical truck-drencher has one 1,500 to 3,000 gallon storage tank with side and overhead coarse-spray nozzles. Drenchers, typically used only during harvest, must be drained periodically to remove dirt, sticks, leaves, and organic wastes, and to recharge the chemical agents. The predominant method for determining when to drain is dependant upon the number of bins processed and label instructions, which specifies the number of bins that can be drenched per gallon of drencher solution. However, drenching solutions have also been drained when the DPA (or other chemical) concentration has tested to be spent, or even when the fluid level reaches the circulating pump intake. Post-applied drenching solution, which has cascaded down through the apples while still in the bins, is ultimately funneled by concrete

berms on the floor of the drencher area into storage tanks. This collected drenching solution is then re-applied (recirculated) onto fresh bins of apples until a decision is made to drain out the solution and make up a new batch.

In **bin-drenching**, the drench solution is applied to the individual bins of fruit, which have been removed from the truck, by spraying them while on a conveyor. A bin-drencher usually has one 500 to 1,000 gallon dip tank.

Packing Processes

When market orders for fresh fruit arrive, the packer opens either a CA or regular cold storage room. Fruit from regular cold storage are typically shipped for up to 90 days after harvest; whereas, CA fruit may be utilized anywhere from 90 to 300+ days after harvest. Whenever a storage room is opened, the stacked bins of fruit are removed, as soon as possible, and brought to the beginning of the packing lines.

Float Tanks

Float tank wastewater solutions frequently contain one of the following fungicides: SOPP; a chlorine-based disinfectant (i.e. sodium hypochlorite); or TBZ. Infrequently used fungicides include Dichloran®, Captan®, Topsin® and Rovral®. Note: None of the Topsin M® products carry post-harvest use directions on their current labels. The labels for Rovral Fungicide® and Rovral WG® were both revised in 1996 to remove post-harvest uses. Gowan's Allisan (Dichloran®) label (EPA Reg. #10163-5569) carries use direction for post-harvest use for only apricots, carrots, nectarines, peaches, plums, sweet cherries, and sweet potatoes. However, in some instances product remaining in the commercial channels may be legally used, therefore the permit will continue to set effluent limits and monitor for these chemicals. During post-harvest operations, residual concentrations are checked relatively often, since these fungicides are typically adsorbed onto solids and organic sugars, which degrades their effectiveness. The Department has determined there is only minor, if any, chemical carry-over from CA storage to float tank wastewater.

The number of float tanks per packing house usually ranges from one to four, with each ranging in size from 500 to several thousand gallons. These tanks, in contrast to drenchers, are typically discharged weekly or be-weekly, year-round, depending on market demand. As each bin is completely submerged, the apples float out, thereby eliminating excessive physical contact which might reduce marketability. The float tank contains water which may be warmed. The water may contain no chemicals or be chlorinated or acidified. Fungicides to control spore growth, if applied, are usually applied on the line. The float solution disinfects the fruit prior to its entering one of two distinct, but similar, packing schemes: (1) non-presized or (2) presized. The interval at which the float solution is emptied varies and depends on each specific packing operation's policy. It is typically done when one of the following occurs: after every week; after reaching a set point such as every 1,000 bins; or when the solution appears dirty.

Additionally, when dealing with pears and the "stone" fruits (i.e. peaches, nectarines and apricots), organic sugars or sodium based salts are added to increase float solution density. The

substances typically used for this purpose are ligninsulfonate, sodium silicate or sodium sulfate, with ligninsulfonate being the most widely used. Although not commonly done, float solutions have been successfully recycled by at least one packer which experienced substantial reduced fungicide costs.

Newer fungicidal technologies such as UV, ozonation and chlorine dioxide have recently been under experimentation. For the past 5 years, one packer has been using a portable ozone generator and dispenser for disinfection of several types of fruit. If proven to be effective, this type of disinfection would eliminate significant chemical use, and in turn, reduced toxics in wastewater discharges. The industry should continue to investigate these alternative types of disinfection technologies

Packing lines

Typically, the industry utilizes two distinct, but similar, packing line schemes: non-presize and presize. The non-presize scheme utilizes six steps: floatation, washing, rinsing, waxing, sorting, and final packaging. The presize scheme uses basically the same steps but in differing orders and includes two different presize methods corresponding to whether the presizing occurs before or after CA storage.

Non-presize schemes can be used with any fruit and can be utilized year round. For apples, the fruit are elevated or conveyed out of the float tank solution by means of a continuous large-mesh (approximately 2-inch) chain screen. This accomplishes both the drainage of excessive adhered float solution and the culling of under-sized (unmarketable) fruit. Those marketable apples which remain on the screen will be dumped onto a conveyance system of horizontal cylindrical rollers, laying perpendicular to the process pathway. Depending on their location in the process pathway, these rollers may be plain, covered by sponge, or covered with bristles (forming a brush).

Next, the apples pass underneath a wash spray, which typically contains a detergent and/or another packing line chemical for the removal of soil and hard water spots. The rollers in this area are usually bristle-covered to physically aid in the effectiveness of the wash solution. The fruits are then rinsed with a spray of freshwater to flush off excess chemicals. The rollers at this point typically are uncovered allowing drainage of the contaminated rinse water.

The fruits finally move across a series of sponge-covered rollers which absorb any remains of the rinse water. Sometimes, additional devices (i.e. fans, heat, dehumidifiers) are used to expedite the removal of adsorbed rinse water through evaporation. From this point on, the rest of the packing process is waterless.

Once dried, the apples pass through a wax spray on top of bristle-covered rollers. This type of roller physically assures application of the waxes, either shellac (fast-drying, high gloss), carnauba (usually for export), or a combination of the two. The wax spray may also contain a fungicide such as TBZ, which is used under a number of trade names, including "Mertect". After passing through the waxer the apples continue on top of regular rollers through a forced-air

dryer/dehumidifier to assure wax fixation. They are then physically directed into specific lanes of movement, which guide the apples through the sorting process.

In the more modernized packing plants, the fruit next passes underneath either or both of the following opto/mechanical devices: a row of electric eyes which analyze for percent color (of red apples), and a row of precise microprocessor-controlled scales for weight determinations. Each individual fruit is carried by a miniature bucket down parallel sorting lines and gently placed at a specific location, which has been calculated by the microprocessor according to various marketing categories pre-selected by the operator. This is in contrast to older facilities, where the fruit is still hand-sorted for both size and color.

At the end of the packing line, the fruit is given a final visual quality control check and packaged into either bulk bags or boxes. These are then put into regular cold storage until time for shipment.

Presize schemes are used mainly with apples and can occur either before or after CA storage. Presize schemes are more extensive and tend to use greater quantities of water than non-presize schemes. This is because fruit conveyance is done by water "flumes" rather than the mechanical devices used in non-presize schemes. A typical presize fruit packer utilizes a number of flumes at any one time, from 6 to 18. Flume dimensions may vary considerably and are 6 inches deep (4 inches of water), 24 inches wide, and from 10 to 40 feet long. The most important factor is that all sorting is completed separately of the packing line, which itself is nearly identical to that of the non-presize scheme.

When presizing occurs before CA, harvested fruit is brought from the fields and drenched with a DPA/TBZ solution if it is to be placed in cold storage after presizing. The fruit is then floated, sorted, and packed or re-binned. The full bins are then placed into CA storage. When market orders arrive, the bins of properly sized apples are retrieved from CA storage and sent through the non-presize scheme (as described above), with exception of sorting, since that has been previously completed.

When presizing occurs after CA storage, binned fruit are floated, washed, rinsed, and sorted. Once the sorting has been accomplished, the apples are re-binned and placed into regular cold storage. When market orders arrive, the bins of properly sized apples are retrieved from storage and sent through the non-presize scheme (as described above), with exception of sorting, since that has been previously completed.

Flumes are generally only used by larger fruit packers (over 50,000 bins/year) for the conveyance of fruit within the processing area. Chlorination is often used to control spore build-up of postharvest decay fungi. However, residual chlorine can potentially combine chemically with other waste products to produce toxic by-products (e.g. chloramines). Investigation should continue into the use of other oxidizers such as chlorine dioxide, UV and ozone.

Wastewater from **pear packing flotation tanks** may contain significant carry-over concentrations of density enhancers from the floatation tanks. Ligninsulfonate is especially prone to this, resulting in a potential for significant BOD_5 loading and color carryover in such

wastewaters. The dark brown color from ligninsulfonate can interfere with UV disinfection systems, pass through a POTW without being treated, and may have other biological impacts to small POTWs.

Packing lines vary between fruit packing houses in the type and quantity of both chemical additives used and wastewater discharged. The fresh fruit packing industry typically uses a detergent wash to remove natural waxes, dirt and other orchard residues from the fruit prior to further processing. Additional apple wash additives may be used to remove hard water deposits which can result from overhead irrigation. Removal of these hard water (calcium/magnesium carbonate) deposits can be aided by products such as those shown in Table 1. Table 1. is not a complete list of packing line chemicals and other products are available.

TABLE 1. TYPICAL PACKING LINE CHEMICALS

Product	Composition	pH	Concentration	Use
Alkchelator	Alkaline based, highly chelated	11.5 to 13.5	1/2% to 2%	For hard water spot removal. Compatible with chlorine.
Agricid	Acetic acid based	Not to exceed 4 (preferably 1.5 to 2.0)	1/2% to 1%	For hard water spot removal.
Aquacid	Organic acid based	Acidic	ND	For hard water spot removal.
D-scale	Phosphoric acid based	Not to exceed 4 (preferably 1.5 to 2.0)	1/2% to 1%	For hard water spot removal.
PREPARE (Use with RENEW)	Sodium alkylbenzene sulfonate	Neutral	3 qts. per 100 gallons	For field soil removal.
RENEW (Use with PREPARE)	Sodium carbonate, trisodium phosphate	Basic	1 to 2 lbs per 100 gallons	For field soil removal.
Reserve	NaOH, SOPP, 2-ethylhexyl sulfate	Basic	1/2 to 1 oz. per gallon	For field soil removal and fungicide.
Stop-Mold F	SOPP	Neutral	1/2%	Fungicide.

After washing, the apples are rinsed with copious amounts of clean fresh water just prior to entering the dehumidifier, waxer, and dryer. Red apples are typically given an application of either a shellac or carnauba-based wax which may also contain small concentrations of SOPP, TBZ, or Ethoxyquin® to prevent bacterial action. Unwaxed fruit (golden apples and pears) may be treated with an FDA-approved minimal concentration of TBZ or Ethoxyquin® to protect them during shipment to market. Packing line and cleanup wastewaters primarily contain detergents, disinfectants, and wax removing products in concentrations which appear compatible with any allowed TDM.

NON-CONTACT COOLING WATER (NCCW)

Chemicals Used To Prevent Fouling

Non-contact cooling water (NCCW) commonly requires some type of treatment, typically chemical, for preventing biological or physical fouling. The industry uses a wide variety of these chemicals in various combinations and concentrations. These types of chemical additives, by their nature, have the potential to exhibit toxicity in the receiving water. A study conducted in November 1991 by the USEPA Region 1 Environmental Services Division on the toxicity of non-contact cooling water discharges in Massachusetts and New Hampshire indicated that a majority of the non-contact cooling water discharges tested caused significant acute or chronic toxicity. Test results reported acute toxicity levels as low as LC50=3.4% effluent, and chronic toxicity levels as low as NOEC=2.5% effluent. Possible causes for the toxicity were investigated, including contaminated source water, presence of metals in the discharges, and the use of biocides or cooling water additives in the discharges. No direct correlation was found between these possible causes and the toxicity exhibited in each case. The USEPA concluded that further study of these discharges was warranted and that state permitting authorities should implement monitoring to identify the toxicity sources in these discharges.[25]

Given the large number of chemicals and the potential synergistic effects of their combinations, it would not be practical to regulate these additives individually in the general permit. Whole Effluent Toxicity (WET) testing is designed for this situation. This permit will specify a WET screening test. Facilities that wish to discharge NCCW containing additives to surface waters must pass the WET screening test to qualify for coverage under the general permit. Those facilities which do not pass the screening test and wish to continue to discharge NCCW containing those additives must apply for coverage under an individual NPDES permit. This WET screening test will also be used to verify the narrative toxicity criteria. WET testing requirements are discussed in more detail in the "TDM" section, "Surface Water" subsection of this fact sheet.

NCCW which contains priority pollutants, dangerous wastes or toxics in toxic amounts, shall only be permitted to be discharged to lined evaporative lagoons.

Good process control is essential in ensuring the proper dosing cycles are used. Using the minimum amount of chemical needed to effectively control fouling not only is better for the environment but also saves the facility money. Alternative NCCW treatments, both new chemicals and non-chemical treatments, should continue to be investigated.

Total Dissolved Solids (TDS) in NCCW

A number of facilities in the fresh fruit packing industry use non-contact cooling water (NCCW) to provide cooling for cold storage. Evaporative losses result in a concentration of dissolved solids in the NCCW. The TDS limit in the current permit is 500 mg/L, which is the ground water quality criterion specified in WAC 173-200. In 1997 approximately 30 facilities reported violations of the TDS limit for discharges of NCCW to dust abatement, land application, or percolation systems. Of the 71 violations reported in 1997 almost 90% have values of less than 1000 mg/L, with a maximum reported value of 1890 mg/L.

TDS is a secondary criterion with the main concern being the aesthetic value of the water. The criterion was set as a drinking water standard at the point where a salty taste could be detected. There is a minimal health risk associated with TDS, especially at the levels reported by the Permittees. TDS is also considered a conservative pollutant. Given the complexity of soil forms and aquifer/soil interactions it is difficult to either generalize or predict the impact of land application of TDS on aquifer concentration. However, given the reported concentration levels and low health risk, the department has determined the new permit will not contain a TDS effluent limit for discharges of NCCW to dust abatement, land application, and percolation systems. Facilities will be required to continue monitoring TDS on a quarterly basis. Systems should be operated to reach a reasonable balance between TDS concentrations and water conservation. Facilities with TDS concentrations greater than 500 mg/L should determine if a reasonable alternative treatment/disposal method (TDM) is available. If the department determines a facility is discharging NCCW which poses a risk of significant degradation to groundwater due to site specific factors, additional monitoring may be required through an administrative order and that facility may be required to apply for an individual wastewater discharge permit.

Sanitary Wastewater

Sanitary wastewater shall not be allowed to be discharged directly to either surface or ground waters of the State. These wastes must be treated in an appropriate manner, typically being sent to either the local POTW or a specifically engineered on-site sewage treatment device (i.e. septic tank). The practice of commingling sanitary and process wastewaters shall be prohibited in those situations where the on-site sewage treatment device was specifically engineered for sanitary wastes only.

Stormwater

Stormwater, as well as some process wastewaters (i.e., NCCW), may be disposed of to surface or ground waters. However, if those stormwaters or process wastewaters have been contaminated or treated with priority pollutants, dangerous wastes (i.e. antifreeze) or toxics in toxic amounts, then they must be appropriately treated and disposed of in manner consistent with conditions in the general permit. EPA regulations concerning storm waters are contained in 40 CFR Parts 122, 123, & 124.

Pollution Prevention / Source Reduction

The industry should continue to examine the possibility of alternatives to reduce the need for, or cost of, wastewater treatment and/or disposal. There is a great deal of pollution prevention information available with details on way to reduce or eliminate pollutants. Such methods include:

1. The **alternative chemical** substitution of environmentally safer products may simplify wastewater treatment and/or disposal. Although chemical substitution may sometimes initially appear to be more expensive, it may over time, result in substantial savings. For example, the relative cost coefficient for an environmentally safer product may be greater

when based on disinfection only. However, when additional costs associated with treating any product residuals and by-products to achieve permit compliance are taken into account, it may make the more expensive environmentally safer product more cost effective overall.

2. The use of **alternative technology** methods which may have economic advantages over normal procedures. For example, the useful lifespan of a specific chemical or process water may be increased substantially through filtration and recycling, thereby reducing both production and/or disposal costs. Technologies for employing reclamation/reuse are also justified in order to achieve BAT and AKART for reducing waste loads in the effluent. Counter-current washes, pre-rinses, and other water management techniques may also be cost effective ways of reducing chemical and water usage. Integrated fruit production (IFP) may reduce the number or amount of chemicals needed.

CHEMICALS USED

The following tables summarize the process water chemicals used by the industry.

TABLE 2. DRENCHER CHEMICALS

Chemical Name	Environmental Fate & Comments	Ecotoxicity Values	CAS #	Uses
Calcium chloride	Stable[1].	LC50 = 900 mg/L 96hr[2]	10043-52-4	Firming agent
DPA	Photochemically reactive. Degraded by soil organisms. Strong adsorption to soil, not expected to leach. Half-life of approximately 30 days.[1]	Old LC50 = 3.79 ug/L 96 hr[4] New LC50 = 2.6 mg/L 96hr[2]	122-39-4	Scald control
Ethoxyquin®	ND	ND	91-53-2	Scald control
Silicone defoamer	pH = 4 to 5			Defoaming agent
TBZ	Strong adsorption to soil, not expected to leach. Half-life of approximately 30 days[1].	MOR = 10 mg/L 24hr[5]	148-79-8	Fungicide

ND = not determined; MOR = mortality

1. Toxnet Literature Review, Toxicology Data Network.
2. Rainbow trout, *Oncorhynchus mykiss*: Source Aquatic Toxicity Information Retrieval.
3. Water flea, *Daphnia magna*: Source Aquatic Toxicity Information Retrieval.
4. Fathead minnow, *Pimephales promelas*: Source Aquatic Toxicity Information Retrieval.
5. Silver salmon, *Oncorhynchus kisutch*: Source Aquatic Toxicity Information Retrieval.

TABLE 3. FLOAT TANK / FLUME CHEMICALS

Chemical Name	Environmental Fate & Comments	Ecotoxicity Values	CAS #	Uses
Calcium hypochlorite	Produces chlorine residuals	LC50 = 920 mg/L 48hr[3]	7778-54-3	Bactericide & fungicide
Captan®	Likely to hydrolyze in moist soil. Strong adsorption to soil, not likely to leach[1].	LC50 = 0.073 mg/L 96hr[2]	133-06-2	Fungicide
Chlorine	High potential to form chloramine by-products. Strong adsorption to soil, not expected to leach[1].	LC50 = 0.017 mg/L 48hr[3]	7782-50-5	Bactericide & fungicide
Chlorine dioxide	Produces chlorine residuals	LD50 = 105 mg/kg	10049-04-4	Bactericide & fungicide
Dichloran®	Half-life in soil up to 30 months. Degraded by soil microorganisms. Strong adsorption to soil, not expected to leach[1].	ND	99-30-9	Fungicide
Ethoxyquin®	ND	ND	91-53-2	Scald control
Lignin-sulfonate	Extremely high BOD	LC50 = 7,300 mg/L 48hr[2]	8061-51-6	Floatation
Rovral®	Photochemically reactive. Half-life of 7 to 40 days in soil. Strong adsorption to soil, not expected to leach.	LC50 = 4.00 mg/L 96hr[2]	36734-19-7	Bactericide
Sodium hydroxide	highly caustic	LC50 = 100 mg/L/96hr[3]	1310-73-2	Fruit wash pH modifier
Sodium hypochlorite	Produces chlorine residuals	LC50 = 0.08 mg/L 96hr[4]	7681-52-9	Bactericide & fungicide

TABLE 3 (cont). FLOAT TANK / FLUME CHEMICALS

Chemical Name	Environmental Fate & Comments	Ecotoxicity Values	CAS #	Uses
SOPP (Stop-Mold F)	ND, pH neutral, conc use = 1000 – 6000 mg/L with pear float, 0.5% on packing line	LC50 = 5.99 mg/L/96hr[4]	90-43-7	Fruit wash
Sodium silicate	ND	LC50 = 113 mg/L[3]	1344-09-8	Floatation
Sodium sulfate	ND	LC50 = 1,190 mg/L/48hr[3]	7757-82-6	Floatation
TBZ	Strong adsorption to soil, not expected to leach. Half-life of approximately 30 days[1].	MOR = 10 mg/L/24hr[5]	148-79-8	Fungicide
Topsin®	Strong adsorption to soil, not expected to leach[1].	LC50 = 7.8 mg/L/48hr[2]	23564-05-8	Fungicide

ND = not determined; MOR = mortality

1. Toxnet Literature Review, Toxicology Data Network.
2. Rainbow trout, *Oncorhynchus mykiss*: Source Aquatic Toxicity Information Retrieval.
3. Water flea, *Daphnia magna*: Source Aquatic Toxicity Information Retrieval.
4. Fathead minnow, *Pimephales promelas*: Source Aquatic Toxicity Information Retrieval.
5. Silver salmon, *Oncorhynchus kisutch*: Source Aquatic Toxicity Information Retrieval.

Note: References to human health refer to those risks associated with impacts of wastewater discharges to waters of the State. It does not refer to risks associated with exposure to any chemical additive or ingestion of any chemical residue on the fruit.

Calcium Chloride

Calcium chloride is used as a post harvest drench at approximately 2200 mg/L (equivalent chloride concentration = 1406 mg/L) to help prevent disorders caused by low calcium levels, such as bitterpit. It may be used alone, but is most often used with DPA (anti-scald) and/or TBZ (fungicide). It is relatively non-toxic to aquatic organisms (LC50 = 900 mg/L for *Oncorhynchus mykiss*) when used in minor concentrations. Human health risks appear to be moderate in that it is a powerful irritant of skin and respiratory systems. In Canada, 50 mg/L has been suggested as the drinking water limit for this chemical. Calcium chloride produces heart failure in mice at a concentration of 280 mg/L. In countries where it is used instead of salt for ice melt, there have been reported serious losses of wild animals drinking slush (containing concentrated calcium chloride) at roadsides. According to literature, this chemical does not biodegrade.

Chloride is a secondary criterion with the main concern being the aesthetic value of the water. The criterion was set as a drinking water standard at the point where a salty taste could be

detected. There is a minimal health risk associated with chloride. Chloride is considered a conservative pollutant in that the only "treatment" it will receive is dilution.

While the discharge of non-DPA drencher water containing calcium chloride to POTWs and percolation systems was allowed in the last permit, these TDMs were discontinued in this permit in the interest of simplification. No facilities are currently using these TDMs and there appears to be no apparent need for them for the discharge of non-DPA drencher water containing calcium chloride. Should the need to use these TDMs arise, a study to determine a mass loading limit would need to be completed. Discharge of any drencher wastewater to surface waters is not allowed.

Drencher wastewater containing calcium chloride may be discharged to lined evaporative lagoons, dust abatement, and land applied. Since calcium chloride is the only source of chlorides in drencher water (except for background chloride), the best way to control chlorides is through the used of best management practices, including specifying a maximum use concentration and a maximum annual application rate. The maximum use rate will be the label use rate of 2200 mg/L of calcium chloride The maximum annual application rate was determined using a biased model to determine the annual application rate of calcium chloride which could be diluted by dormant season precipitation to a concentration which would be protective of the groundwater quality. This model was based upon the following assumptions:

- Calcium chloride will be used at the maximum label rate of 2200 mg/L. This is equivalent to 1406 mg/L chloride.

- Allow 94 mg/L chloride in the makeup water.

- Drencher wastewater containing calcium chloride will use the same best management practices as those for DPA drencher water applied to dust abatement (i.e. no ponding, no runoff, no application to frozen/snow covered sites, etc.).

- The maximum daily application rate will be 1800 gallons / acre / day, which is the same as for DPA drencher water to dust abatement

- All the spent drencher solution will be applied during the fall harvest season.

- All the water in the spent solution will evaporate so only the dormant season precipitation will provide dilution. This is the same assumption for DPA disposal.

- There will be minimum of 2 inches of annual precipitation available for dilution. This is based upon the Yakima 10 year return period dormant season precipitation available to recharge the soil reservoir as calculated in "Irrigation Requirements for Washington - Estimates and Methodology, James, Erpenbeck, Bassett, and Middleton, WSU Agricultural Research Center, Research Bulletin XB 0925 1982. This value takes into account dormant season precipitation, surface runoff, and

evapotranspiration.

- The estimated groundwater background chloride concentration and therefore the target diluted chloride concentrations is 50 mg/l. Anti-degradation requires protection of existing background water quality.

- A large facility would dispose of approximately 60,000 gallons of spent drencher solution annually.

The following excel spreadsheet details the calculations for determining the maximum annual application rate for spent drencher water containing calcium chloride based upon the above assumptions.

DILUTION MODEL FOR THE APPLICATION OF
SPENT DRENCHER WATER CONTAINING CALCIUM CHLORIDE

	CONSTANTS	
A	LABEL RATE CALCIUM CHLORIDE CONCENTRATION (MG/L)	2200.00
B	LABEL RATE CHLORIDE CONCENTRATION (MG/L) A * 2D / (C + 2D)	1406
C	MOLECULAR WEIGHT OF CALCIUM	40.08
D	MOLECULAR WEIGHT OF CHLORINE	35.45
E	MAXIMUM DAILY APPLICATION RATE (GAL/ ACRE) - BASED ON DPA PERMIT LIMIT	1800.00
F	SQUARE FEET / ACRE	43560.00
G	LITERS / GALLON	3.79
H	GALLONS / FT3	7.48
I	GRAMS / POUND	453.59
J	INCHES / FOOT	12.00
K	MILLIGRAMS / GRAM	1000.00
L	FEET / MILE	5280.00
M	WIDTH OF ORCHARD ROADS (FT)	15.00
	VARIABLES	
N	DILUTION WATER RETURN INTERVAL (YEARS)	10
O	AVAILABLE DILUTION WATER (IN)	2.00
P	CHLORIDE CONCENTRATION - TARGET AFTER DILUTION (MG/L)	50.00
Q	CHLORIDE CONCENTRATION - IN MAKEUP WATER, ESTIMATED (MG/L)	94.00
R	ESTIMATED MAXIMUM ANNUAL DISCHARGE (GAL)	60000.00
	CALCULATED VALUES	
S	MAXIMUM ALLOWED CHLORIDE CONCENTRATION (MG/L) B + Q	1500
T	AVAILABLE DILUTION WATER (LITERS /ACRE) O / J * F * G * H	205544
U	CHLORIDE IN DRENCHER SOLUTION (LBS/ GALLON) S * G / I / K	0.013
V	LBS CHLORIDE / ACRE / YEAR WHICH CAN BE APPLIED RESULTING IN TARGET CHLORIDE CONCENTRATION P * T / I / K	22.7
W	ALLOWED APPLICATION RATE (GALLONS / SITE / YEAR) V / U	1811
X	**ALLOWED NUMBER OF APPLICATIONS / SITE / YEAR W / E**	**1.0**
Y	ACRES REQUIRED FOR ESTIMATED MAXIMUM ANNUAL DISCHARGE R / W	33.1
Z	MILES ORCHARD ROAD REQUIRED FOR ESTIMATED MAXIMUM ANNUAL DISCHARGE Y * F / L / M	18.2

The above model indicates wastewater containing calcium chloride used at the label rate of 2200 mg/L has a maximum annual and daily application rate of approximately 1800 gal/acre.

Chlorine-based Chemicals

Chlorine dioxide, ClO_2, is a powerful oxidizing agent used as an alternative disinfectant for chlorine. It is a greenish-yellow gas which is typically produced on-site due to its explosive nature: at large concentrations (above 10%) in air it may explode upon contact with any ignition source[21]. Oral rat toxicity studies show an LD50 = 105 mg/kg. It is expected that normal use concentrations will be between 3.0 mg/L and 5.0 mg/L[22]. Industry sources indicate actual use concentrations are actually 1.0 – 2.0 mg/L. Off-gassing of chlorine can occur with the use of

chlorine dioxide, so worker health should be considered. Human health concerns with the wastewater should be low when used at normal use concentrations.

Calcium hypochlorite, sodium hypochlorite, and other chlorination chemicals are very common disinfectants used during the packing of fruit. Typically, the chemical sodium hypochlorite is used at concentrations ranging from 5 to 150 ppm. The majority of these disinfectants are highly toxic to aquatic organisms (sodium hypochlorite LC50 = 0.080 mg/L for *Pimephales promelas* & chlorine LC50 = 0.017 mg/L for *Daphnia magna*). Total residual chlorine is sometimes used as a sewage "freshener" upstream of a main POTW facility in concentrations approximating 0.50 mg/L.

Fruit packing wastewaters generally lack significant amounts of ammonia and/or nitrogenous compounds[5,9,18], which upon contact with chlorine can form highly toxic chloramines. Residual chlorine concentrations are also of concern since they are extremely toxic/reactive for aquatic organisms[10]. Residual chlorine, in the absence of ammonia, may also produce chloroform due to its reactivity with organic material. Fruit processing wastewaters are typically low in ammonia[5,16]. An exception to this is chlorine dioxide which inhibits the formation of chloroform[19], has 2.5 times the oxidizing capability of chlorine, and generates no chloramines or trihalomethanes[20].

The fruit packing industry is encouraged to employ pollution prevention and waste reduction techniques, or chemical substitution, regarding chlorine-based fungicide usage in order to discourage high total residual chlorine concentrations. These techniques should minimize the formation of potentially toxic or environmentally unsound wastestreams, and thereby protect the water quality of State ground and surface waters.

Dechlorination must be done if residual chlorine concentrations exceed the effluent limits. This can include such techniques as volatalization or chemical dechlorination with reducing agents such as sodium sulfite or other chlorine neutralizing chemicals.

The most stringent Total Residual Chlorine discharge limit for dust abatement and land application will be the dangerous waste regulation calculated maximum concentration limit of 10.0 mg/L (total residual chlorine). Discharges to POTWs will be limited to 0.50 mg/L of total residual chlorine. Discharges to percolation systems will be limited to 5.00 mg/L. Discharges to surface water will be limited to 0.011 mg/L, which is the acute freshwater water quality criterion. However, due to the lack of a reasonably priced field test kit which can detect total residual chlorine to this level, the established Quantitation Level (analytical detection limit), when using the DPD/colorimeter test method, 40 CFR Part 136, of 0.05 mg/L, shall serve as the enforceable limit for this parameter. A measured value between 0.011 and 0.05 mg/L may not be a violation due to the uncertainty of the test method, and shall be reported as "less than 0.05 mg/L".

CAPTAN

Captan®, (4-cyclohexane-1,2-dicarboximide,N-((trichloromethyl)thio)), is an infrequently used fungicide, principally applied on stone fruits and berries. CAPTAN is utilized at concentrations up to a maximum of 1,200 mg/L. It is extremely toxic to aquatic organisms (LC50 = 0.073 mg/L for *Oncorhynchus mykiss*), while acute oral rat toxicity studies show an LD50 = 10,000 mg/kg. It readily adsorbs onto, and is practically immobile in, soil and degrades by both chemical and biological methods. CAPTAN, up to 250 mg/L, is not persistent and in moist soil has a half-life from 1 to 5 days; however, in dry soil up to 2 months. CAPTAN also has a half-life in water from 10 minutes to 12 hours; however, its toxicity makes it prohibited from entering waters of the State. Human health risk appears to be moderate due to low dermal toxicity and carcinogenic potential.

The strictest discharge limit for dust abatement and land application would be the dangerous waste regulation calculations which indicate a maximum concentration limit of 10.0 mg/L. Due to aquatic toxicity data, CAPTAN shall be prohibited from discharge to any TDM other than a lined evaporative lagoon, dust abatement or land application.

DICHLORAN

Dichloran®, (2,6-dichloro-4-nitroaniline), is another infrequently used fungicide, principally applied on stone fruits and berries, by way of the product BOTRAN (a combination of DICHLORAN and CAPTAN). Toxicity studies have not been found (LC50 = ND), but it is assumed to be very toxic to aquatic organisms due to, at least, its CAPTAN component. The chemical is tightly adsorbed onto soil particles and organic matter with a corresponding half-life from 1-3 weeks (under flooded conditions) to 13-30 months (under dry soil conditions). This potentially long half-life supports DICHLORAN being classified as highly persistent and non-biodegradable. Any available degradation is probably due to microbial action, which must develop over time. The addition of microbial-enhancing substances (such as glucose, alfalfa, and rice straw) decreases its persistence in soil. In water, DICHLORAN has shown no tendency to hydrolyze or volatilize. Human health risk is presumed to be moderate due to low acute toxicity, low dermal toxicity, "No Effect" level of 1,000 mg/kg seen in rat toxicity studies, and low carcinogenic potential.

The strictest discharge limit for dust abatement and land application will be the dangerous waste regulation calculated maximum concentration limit of 10.0 mg/L. Due to its CAPTAN component and assumed aquatic toxicity, DICHLORAN shall also be prohibited from discharge to any TDM other than a lined evaporative lagoon, dust abatement or land application.

DPA

DPA, diphenylamine, is the most commonly used product in drenching solutions (1,000 to 2,200 mg/L). It is a chemical anti-oxidant that prevents the brown "scald" discoloration of apples, and may be used either alone or in combination with TBZ or Ethoxyquin®. DPA has been found to interfere with POTW processes at 10 mg/L, and since actual discharges have significantly interfered with POTWs, this method of disposal will now be prohibited. An early formulation of DPA was highly toxic to aquatic life (LC50 = 3.79 ug/L for *Pimephales promelas*)[6,7]. However, a Department study (December 1988) conducted with a newer high-purity DPA product showed significantly less toxicity (LC50 = 2.6 mg/L for *Oncorhynchus mykiss*). This same study also found that actual drencher wastewaters had an average LC50 = 1,315 mg/L (*Onchorhyncus mykiss*). Oral rat studies have shown an LD50 = 3,000 mg/kg. Human oral studies have shown that the lowest published lethal dose is 500 mg/kg. DPA readily adsorbs onto soil, exhibiting low motility. It undergoes rapid degradation in the presence of ultraviolet (UV) light and air[8], having a half-life of approximately 30 days in unamended soil. However, humic substances enhance the degradation process, showing a half-life of approximately 10 days.

Discharges to a lined evaporative lagoon will not be subject to concentration limits. The most stringent discharge limit for both dust abatement and land application will be the maximum normal use concentration of 2,200 mg/L. The Department will require an annual analysis of this parameter, for the above TDMs, if the Permittee complies with all the terms and conditions of the general permit and applies this wastewater at a rate of not more than 1,800 gallons/acre/day, and no more frequently than every other day, 30 times per year. Discharges to any TDM other than a lined evaporative lagoon, dust abatement or land application is prohibited.

Ethoxyquin®

Ethoxyquin® is an antioxidant used to control pear scald. This chemical is typically used at a concentration of approximately 2,700 mg/l and should not be used in conjunction with other chemicals. Specific aquatic toxicities, effects on POTWs, and environmental degradation processes are not known. Single 500 mg/kg oral dose to rats showed serious ultrastructural changes in their livers. The lowest published lethal dose to humans was 500 mg/kg. Human health risks appear to be moderate, as cases of skin irritation upon contact have been reported.

The strictest discharge limit for both dust abatement and land application will be the maximum normal use concentration of 2,700 mg/L. The Department will require an annual analysis of this parameter, for the above TDMs, if the Permittee complies with all the terms and conditions of the general permit and applies this wastewater at a rate of not more than 1,800 gallons/acre/day, and no more frequently than every other day, 30 times per year. Since specific aquatic toxicities, environmental fate, and effects to POTWs are not known, the effluent limits will be estimated by best professional judgement. Discharges to POTWs and to percolation systems will be limited to 50.0 mg/L and 5.00 mg/L of Ethoxyquin®, respectively.

Ligninsulfonate

Ligninsulfonate, a density enhancer, is used to float pears and stone fruits at the beginning of packing operations. The normal float tank concentration is 12% (120,000 mg/L) ligninsulfonate, of which 50% or 60,000 mg/l are solids. The BOD to solids ratio is generally 0.3 to 1 resulting in approximately 18,000 mg/L BOD_5 in the float tank solution. At these discharge concentrations this chemical is extremely toxic, even though the chemical is usually considered non-toxic (LC50 = 2,400 mg/L for *Oncorhynchus mykiss*). However, other process wastewaters downstream of the float tank will typically contain less ligninsulfonate and therefore have a reduced potential for impacting the environment. Oral rat toxicity studies indicate an LD50 = 28,500 mg/L. The high BOD_5 quality of float tank discharges would be potentially detrimental under all TDMs except for dust abatement, since ligninsulfonate has a strong affinity to adsorb to soil.

The strictest discharge limit for dust abatement will be the normal float tank use concentration of 12% or 120,000 mg/L ligninsulfonate . The Department will not require analysis of this parameter, for the above TDM, if the Permittee complies with all the terms and conditions of the general permit.

Other ligninsulfonate-containing process discharges shall be allowed to be discharged to POTWs, land application or dust abatement. However, there is a strong potential for effluent limit violations to these TDM limits due to spills and carryover into the rinse water of this extremely high BOD_5 and dark colored material. At several facilities sufficient ligninsulfonate entered the rinse water to adversely affect the operation of a POTW, either by the BOD_5 exceeding the limits or by the color interfering with the UV disinfection system and passing through the system untreated. Measures must be taken to ensure that such discharges shall not exceed any limit given for any specific TDM or cause any interference or by-pass at a POTW. Such measures can include process and source control methods such as countercurrent washing systems, pre-rinse bars, collection and return of tank overflow and other runoff to the dump tank, recycling, dry dump systems, alternative chemicals, or any other new pollutant reduction techniques that become available.

At such time that scientific evidence would indicate that different limits and/or TDMs would be possible without causing significant potential to violate any State or Federal law or standard, then the general permit may be modified accordingly.

Ozone

Ozone, the tri-atomic molecule of oxygen, is a bluish gas which has been used for disinfecting drinking water since 1893. The effectiveness of ozone is not as dependent on pH and temperature as is chlorine, nor does it require extensive contact time[10]. Ozone does not react appreciably with ammonia and produces no known toxic by-products. It has a disinfection power (potential) of, at least, twice that of chlorine. Experiments at the Hood River Experiment Station, Oregon, have given important and positive data about this disinfectant concerning the fruit packing industry. These experiments found that ozone at 0.3 ppm, or chlorine at 54 ppm, in dump (float) tank water controlled *Penicillium* and *Cladosporium* to the same levels. An ozone level of 0.5 ppm killed approximately 80% of the spores in an exposure time of three (3) minutes[11]. Ozonation is not known to have caused any injury to fruit in any situation to date.

Packing Line Chemicals

Packing line chemicals (Table 1) are not all usually applied at any single packing house. Each fresh fruit packer selects to use only those chemicals which are most appropriate through past experience. The chemicals are typically applied by a spray and are suspected to be a minor component of the total wastewater flow discharged from the fresh fruit packing lines. At normal concentrations, the packing line chemicals would probably not be detrimental under any of the TDMs, except surface waters, allowed by the general permit. Discharge of wastewater containing packing line chemicals will be allowed to any TDM except surface water. No monitoring of these chemicals will be required. The discharge limits will be the normal label use rates for each chemical. For increased efficiency, the packing line spray systems should use High Pressure Low Volume (HPLV) spray-head technology. The volume of applied spray water by this technology is significantly decreased from that typical for normal spray systems, while still maintaining adequate fruit coverage.

ROVRAL®

Rovral®, (iprodione), is an infrequently used, recent fresh fruit packing fungicide product labeled for use only on stone fruit at a typical concentration of 2,200 mg/L. Rovral® is toxic to aquatic organisms (LC50 = 4.0 mg/L for *Oncorhynchus mykiss*). Oral rat toxicity studies show a LD50 = 4,400 mg/kg. Human health risk appears low.

The strictest discharge limit for dust abatement and land application will be the dangerous waste regulation calculated maximum concentration limit of 1,000 mg/L. Discharges to POTWs and percolation ponds will be limited to 23.0 mg/L and 4.00 mg/L of Rovral®, respectively. NOTE: Rovral® is not labeled for post-harvest use on apples or pears.

Silicone Defoaming Agent

Silicone defoaming agent (organosilicone fluid emulsion) is typically used up to a maximum of 100 mg/L, which corresponds the maximum FDA limit of 10 mg/L silicone solids. It has a pH between 4 to 5. Human health risks appear to be low as the product used is FDA food grade.

The strictest discharge limit for any application will be the maximum normal use concentration of 100 mg/L. The Department will not require analysis of this parameter if the Permittee complies with all the terms and conditions of the general permit.

Sodium Silicate

Sodium silicate, a density enhancer, is used at a starting concentration of 30,000 ppm. It is considered mildly toxic, with an LC50 = 113 mg/L for *Daphnia magna*. Oral rat toxicity studies indicate an LD50 = 13 mg/kg. Sodium silicate has been detrimental to some POTW processes due to its abrasiveness and corrosive nature. However, this same characteristic may have significant road maintenance qualities that would be appropriate to dust abatement.

The strictest discharge limit for dust abatement and land application would be the maximum normal use concentration of 30,000 mg/L. Sodium silicate is prohibited from discharge to any TDM other than a lined evaporative lagoon, dust abatement, or land application. NOTE: Untreated wastewaters containing sodium silicate will normally be high in pH (10 to 11) and will therefore need to be neutralized to at least 9.0 pH immediately after application.

Sodium sulfate

Sodium sulfate, a density enhancer, is also used at a starting concentration of 30,000 ppm. It is relatively non-toxic, with an LC50 = 1,190 mg/L for *Daphnia magna*. The FDA has classified this chemical as an indirect food additive, due to being poorly absorbed into the gastrointestinal tract.

The strictest discharge limit for dust abatement, POTWs, land application and percolation will be the State's ground water quality standard of 250 mg/L. Sodium sulfate is prohibited from discharge to any TDM other than a lined evaporative lagoon, dust abatement, land application, POTW, or percolation systems. NOTE: Untreated wastewaters containing sodium sulfate will normally be high in sulfate and will therefore need to be desulfonated prior to discharge to meet the effluent limit. One method of desulfonation is the use of calcium carbonate (spent lime) to precipite the sulfate as calcium sulfate (gypsum).

SOPP

SOPP, sodium ortho-phenylphenol is a fungicide commonly used in float tanks at concentrations from 3,000 to 6,000 ppm. It is used primarily with one of the three pear float enhancers, ligninsulfonate, sodium sulfate, and sodium silicate, with ligninsulfonate being by far the most prevalent. This chemical has proven to be highly toxic to aquatic life at concentrations typically discharged in the fruit packing industry (LC50 = 5.99 mg/L for *Pimephales promelas*). In experiments with activated sludge systems, SOPP has caused upsets at slug loadings of 50 mg/L or greater. Chlorine should not be used in conjunction with SOPP because the chlorine would destroy the SOPP and possibly form polychlorobiphenyls (PCBs)[8], and the chlorine would not be able to attain a free disinfection residual that would be able to destroy postharvest pathogen spores. Acute oral rat toxicity studies show an LD50 = 1,160 mg/kg. At lower than 10 mg/L concentrations, SOPP is easily and rapidly biodegradable (half-life of approximately 7 days) under aerobic conditions in both soil and water. Human health risk is not-determined but is suspected to be moderate due to the toxicity data for pure phenol, which is chemically similar.

Discharges to POTWs will be limited to 50.0 mg/L of SOPP, the lowest concentration which caused POTW upsets from slug loadings. Discharges to percolation systems will be limited to 6.00 mg/L of SOPP, the LC50 toxicity value.

The first permit set the strictest discharge limit for dust abatement and land application at 1000 mg/L, which was the minimum concentration at which the wastewater would designate as a dangerous waste under the Dangerous Waste Regulations which were in effect at that time. This created a conflict since the normal usage rate of SOPP in pear float tanks is 3000 – 6000 mg/L. In January 1994 the Dangerous Waste Regulations were amended. This resulted in float tank

wastewater containing SOPP and a float enhancer at the current normal maximum use rates (SOPP = 6000 mg/L, ligninsulfonate = 120,000 mg/L (12% solids), sodium sulfate and sodium silicate = 30,000 mg/L (3% solids)) no longer designating as a dangerous waste under the new regulations.[23] Although the Dangerous Waste Regulation was no longer the limiting factor in establishing the effluent limit, the limit could not be made less stringent unless there was scientific evidence about the environmental fate of SOPP to support the change. To do this the industry would have to submit to the department an engineering report, which would include an AKART analysis and a determination of the environmental fate of SOPP. An alternative to changing the limit was to maintain the 1000 mg/L limit but to express it on a mass loading basis and then specify proportionally lower application rates as the SOPP concentration exceeds 1000 mg/L. Based upon input from the packing industry, the second option was chosen.

The daily maximum application rate in the first permit for discharging wastewater containing ligninsulfonate and SOPP for dust abatement is 4840 gal/acre/day, 52 times per year. Using this as the base rate, the following formula was used to calculate application rates for concentrations greater than 1000 mg/L.

$$\text{Rate}_{[\text{SOPP}>1000]} = \text{Rate}_{[\text{SOPP}<1000]} \times \text{SOPP Effluent Limit (mg/l)} / \text{Actual SOPP concentration}$$

$$= 4840 \text{ gal/ac/day} \times 1000 \text{ mg/l} / \text{Actual SOPP concentration}$$

Application at these rates will be limited to dust abatement and land application. Application frequency will be limited to once per week to reduce the risk of the SOPP inhibiting the micorobial action needed for it degradation. The maximum SOPP concentration will be set at the normal maximum use concentration of 6000 mg/L for the same reason. These limits are subject to change if additional reference materials becomes available, or if any biological testing or monitoring indicates these SOPP concentrations are not being adequately treated .

THIOBENDAZOLE (TBZ)

TBZ is the principal fungicide alternative for Benomyl (no longer registered for use) and is typically used in conjunction with DPA in the drencher solutions. It is typically used at concentrations of 2,700 mg/l to control blue and grey molds. TBZ is moderately toxic to aquatic life (MOR = 10 mg/L for *Oncorhynchus kisutch*) and has shown POTW toxicity at slug-loads above 50 mg/l. Oral rat studies have shown a LD50 = 3,330 mg/kg. Human health risk appears to be low. TBZ is readily adsorbed onto, and is practically immobile, in soil with a half-life of about 30 days.

The most stringent discharge limit for both dust abatement and land application will be the maximum normal drencher use concentration of 500 mg/L. The Department will require an annual analysis of this parameter, for the above TDMs, if the Permittee complies with all the terms and conditions of the general permit and applies this wastewater at a rate of not more than 1,800 gallons/acre/day, and no more frequently than every other day, 30 times per year.. Discharges to POTWs will be limited to 50.0 mg/L of TBZ; whereas discharges to percolation will be limited to the aquatic toxicity value of 10 mg/L.

TOPSIN®

TOPSIN®, (methyl-thiophanate), is an infrequently used fungicide, principally applied on stone fruits and berries. When used, it is utilized at concentrations up to a maximum of 840 mg/L. TOPSIN is toxic to aquatic organisms (LC50 = 7.8 mg/L for *Oncorhynchus mykiss*). Oral rat toxicity studies show an LD50 = 6,640 mg/kg. TOPSIN is readily adsorbed onto, and is practically immobile in, soil. Little is known about environmental degradation. Human health risk appears to be low.

The strictest discharge limit for dust abatement and land application would be the maximum normal use concentration of 840 mg/L. The Department will not require analysis of this parameter, for the above TDMs, if the Permittee complies with all the terms and conditions of the general permit. An analysis of paired acute LC50 values to their POTW threshold values for various chemicals has shown an average multiplier of 5.7. This multiplier can then be used to estimate an unknown POTW threshold value of another chemical whose acute LC50 is known. Using this information, discharges to POTWs will be limited to 44.0 mg/L of TOPSIN. Discharges to percolation will be limited to 7.80 mg/L.

ULTRAVIOLET LIGHT (UV)

UV has been studied as a disinfectant since 1893. It includes light with wavelengths from 150 to 4,000 Angstroms, with 2,537 Angstroms being the most effective[10]. UV's disinfecting properties are due to its direct reactions with the nucleic acids in an organism's cellular structure. The amount of energy (uW/sq.cm.) needed to destroy a specific bacterium, fungi, or fungal spore is quite variable. Other factors which limit UV disinfection are: (1) the water medium itself; (2) the amount of turbidity; and (3) the amount of organic matter present. Small-scale projects have shown that UV is easy to install and has the benefit of not producing any toxic residuals or by-products. Given these advantages, the industry should continue to investigate UV technology to determine if advances will make it a viable disinfection option.

WAX

Wax (carnauba or shellac) coatings, with/without fungicide additives, are often applied to give fruit physical protection and an attractive appearance for shipment. Again, these products are spray applied and are assumed to be a minor contributor to overall wastewater discharges and thus not detrimental to any of the TDMs, except surface waters. Human health risk appears to be low, as these are typically food grade additives.

BIOLOGICAL CONTROL AGENTS

A limited number of facilities are using a biological agent for the control of mold and rot on pears, apples, and cherries. At present the only agent in use is Bio-Save®, which is produced by EcoScience and is based on bacterium strains of *Psuedomonas syringae*. Other similar agents based on yeasts are also being developed.

Bio-Save® fungicides are based on naturally occurring, non-pathogenic, non-genetically engineered bacterium strains of *Psuedomonas syringae,* which were isolated from apple and pear orchards in the US. It is generally applied to apples and pears via an overhead drip or spray, or over donut rolls or brushes. This application results in minimal discharge, basically during clean-up. It can also be used in a drench. Once mixed for application, Bio-Save® has a shelf life of 24 to 48 hours. It is killed on contact with sanitation cleaners such as bleach and quaternary ammonium compounds.

Evidence suggests Bio-Save® controls fruit infection by out competing the pathogen for nutrients at the wound site on fruit surfaces. There is no evidence of significant antibiotic production. It has received registration by USEPA and is exempted from all residue tolerance levels granted by USEPA. According to the Codex Committee on Pesticide Residues, Bio-Save® does not represent a health concern and has no requirement of MRLs (maximum limits for pesticide residues).[24] The department has determined monitoring for Bio-Save, or other similar products, is not needed at this time. The department will continue to work with the manufacturer to track development and use of these products. Should additional information indicate these types of products pose a significant risk to water quality, the permit may be modified to included additional monitoring or BMPs.

TREATMENT / DISPOSAL METHODS (TDMS)

SELECTION OF TDMs

The Department has studied the characteristics of wastewater discharges from the fresh fruit packing industry. The TDMs discussed below were designed for the protection of: waters of the State; POTWs; and human health. These TDMs shall not conflict with stricter existing zoning, land use, and/or local health department regulations.

The general permit will require the Permittee to identify all of the wastestreams to be discharged by the facility. The Permittee shall then select for each wastestream, the appropriate TDM based upon the chemicals contained in the wastestream (see Table 4.).
A fresh fruit packing facility may use any of the following TDMs, as appropriate:

1. **Lined evaporative lagoons** - An imperviously lined, engineered structure which relies entirely upon evaporation for water removal. This may be a lined evaporative lagoon or a pre-manufactured, above-ground fiberglass or metal tank. The lagoon liner must be a geomembrane liner which meets or exceeds the specifications of a 30 mil HDPE geomembrane liner. For the purposes of this permit, clay liners are not acceptable..

2. **Dust abatement** - Dust Abatement is the application of wastewater to unpaved bin storage lots and unpaved roads for the purpose of dust suppression. This TDM is intended primarily for the discharge of drencher wastewater and pear float tank wastewater containing ligninsulfonate, sodium sulfate, or sodium silicate. Wastewaters containing sodium sulfate may require desulfonation prior to discharge to meet the total sulfate effluent limit. Wastewaters containing sodium silicate may require neutralization prior to or immediately after discharge to meet the pH effluent limit. Float tank and rinse water may also be discharged to the dust abatement TDM with certain application rate restrictions.

3. **Publicly Owned Treatment Works (POTW)** - A POTW is a municipal or regional wastewater treatment plant.

4. **Land application** - Land application uses an engineered system for applying wastewater to a vegetated land surface. The applied wastewater is treated by the chemical, biological, and physical processes as it flows through the plant-soil matrix. The system consists of the land application site, a distribution system such as sprinklers for evenly distributing the wastewater, and a lined lagoon (or other Department approved, self-contained storage system) for storing wastewater during periods when it cannot be land applied. It is analogous to the slow rate land treatment process as described in the EPA Process Design Manual and Supplement for the Land Treatment of Municipal Wastewater (EPA 625/1-81-013 and –013a). This design manual or other relevant Department approved documents (i.e. Guidelines for Preparation of Engineering Reports for Industrial Wastewater Land Application Systems, Department of Ecology Publication #93-36) shall be used as guidance for designing land application systems.

5. **Percolation Systems** - A Percolation System is an engineered system for treatment of wastewater as it percolates through the soil matrix. The system is designed to account for hydraulic and nutrient loading rates, wet and dry cycles, even wastewater distribution, and other relevant design parameters. It is analogous to the rapid infiltration land treatment process in the EPA Process Design Manual and Supplement for the Land Treatment of Municipal Wastewater (EPA 625/1-81- 013 and –013a). This design manual or other relevant Department approved documents shall be used as guidance for designing land application systems.

6. **Surface water** - Discharge to a surface water of the state which includes lakes, rivers, ponds, streams, inland waters, irrigation canals and return drains, saltwaters, wetlands, stormwater or other collection systems which discharge to a surface water, and all other surface waters and watercourses within the jurisdiction of the State of Washington.

A facility wishing to obtain coverage under the Fresh Fruit Packing General Permit must, at least, comply fully with all applicable specifications and BMPs set forth in the terms and conditions of this general permit. Failure to do so may result in a permit violation and/or constitute the need to obtain an individual NPDES or State Wastewater Discharge permit.

TABLE 4. SELECTION OF TREATMENT / DISPOSAL METHODS (TDMs)

WASTE-WATER SOURCE	CHEMICALS USED	ALLOWED TDMs					
		LINED EVAP LAGOON	DUST ABATEMENT	POTW	LAND APPLICATION	PERCOLATION SYSTEMS	SURFACE WATER
DRENCHER	TBZ and/or Ethoxyquin® only	yes	yes	yes	yes	yes	
	DPA and/or Calcium chloride	yes	yes		yes		
FLOAT TANK OR FLUME	No chemicals or only chlorine based fungicides	yes	yes	yes	yes	yes	yes
	Non-chlorine based fungicides, excluding Captan® and/or Dichloran®	yes	yes	yes	yes	yes	
	Sodium sulfate with/without fungicides, excluding Captan® and/or Dichloran®	yes	yes	yes	yes	yes	
	Sodium silicate with/without fungicides	yes	yes		yes		
	Captan® and/or Dichloran®, excluding Ligninsulfonate	yes	yes		yes		
	Ligninsulfonate		yes				
RINSE WATER & HYDRO-COOLER WATER	No chemicals, additives, or only chlorine-based fungicides	yes	yes	yes	yes	yes	yes
	Only washing and waxing chemical products	yes	yes	yes	yes	yes	
	Only non-chlorine-based fungicides, excluding Captan® and/or Dichloran®, without/with washing and waxing chemical products	yes	yes	yes	yes	yes	
	Sodium sulfate without/with fungicides, excluding Captan® and/or Dichloran®, without/with washing and waxing chemical products	yes	yes	yes	yes	yes	
	Sodium silicate without/with fungicides, without/with washing and waxing chemical products	yes	yes		yes		
	Captan® and/or Dichloran®, excluding ligninsulfonate and sodium sulfate	yes	yes		yes		
	Ligninsulfonate		yes	yes	yes		
NCCW	No priority pollutants, dangerous wastes, or toxics in toxic amounts	yes	yes	yes[1]	yes	yes	yes
	With priority pollutants, dangerous wastes, or toxics in toxic amounts	yes					

[1] Discharge of NCCW to a POTW is allowed only under extraordinary circumstances and requires the approval of both the Department and the POTW.

INSPECTION OF TDMs

Regular inspections shall be made of all TDMs at a frequency to ensure their proper operation. For dust abatement, land application, and percolation systems this inspection shall take place at the time of discharge. Any abnormalities shall be recorded in the facility logbook along with a description of any actions taken to correct the problem. Examples of such abnormalities include, but are not limited to: high liquid levels, rapid changes in lagoon liquid levels, holes or deterioration in a liner, washouts, overflows, abnormal odors or colors, ponding, runoff, overland flow, abnormal crop growth, soil or water quality deterioration, sediment build-up, changes in biota, etc. Discovery of any significant abnormality shall be cause for taking immediate corrective actions and shall also be reported to the Department within 48 hours of discovery, along with a description of the corrective action taken or planned.

MINIMUM SETBACKS

	Minimum Setback Distance (Feet) to:	
	Surface waters of the State, Irrigation supply ditches, Drainage ditches, Wetlands	Potable water supply well
IMPOUNDMENT TYPE		
Lined lagoons with DPA	250	250
Lined lagoons without DPA	50	100
Unlined lagoons	50	100
APPLICATION SITE		
Dust abatement	50	100
Land application	50	100
Percolation systems	50	100

- The setbacks to potable water supply wells were determined using BPJ and, as guidance, WAC 173-160-205, which states that wells shall be located at least 100 feet from known or suspected contamination sources.

- No impoundments or wastewater applications are allowed within Wellhead Protection Areas.

- Impoundments shall be located, designed, and managed to control odors and insects.

TREATMENT/DISPOSAL METHOD SPECIFICATIONS

1. LINED EVAPORATIVE LAGOONS

These devices rely on the evaporation of wastewater held in an imperviously lined structure. Liners are usually referred to as being composed of clay, amended soil, geomembrane, or any combination of these. The Department has determined that clay and amended soil liners are less desirable than geomembrane liners due to extreme dependency on liner compositional characteristics and construction methods; a slight mistake in any of which may allow substantial percolation[12]. Geomembranes are composed of man-made materials such as: thermoplastics (i.e. polyvinyl chloride [PVC]); crystalline thermoplastics (i.e. high density polyethylene [HDPE]); elastomers (i.e. butyl rubber); and, thermoplastic elastomers (i.e. Hypalon). These liners are typically non-reactive to chemicals in wastewater; however, some types will lose plasticizer (degrade) when exposed to ultraviolet (UV) light. HDPE is very UV resistant, with PVC being significantly less resistant.

For facilities desiring coverage under the Fresh Fruit General Permit, the Department will require all evaporation lagoons to be constructed with a geomembrane liner which meets or exceeds the specifications of a 30 mil HDPE geomembrane liner. The Department may require, in certain situations, the use of a geomembrane liner with higher specifications and/or double-layered liners. Appropriate State licensed engineers and contractors will need to be used for both the specialized design and installation procedures of a lined evaporation lagoon.

Best Management Practices for Lined Evaporative Lagoons

a. Pollutant/parameters are limited by full compliance with the required BMPs. No chemical testing shall be required for such discharges.

b. Drencher discharges shall not be commingled with any other process wastestreams.

c. A minimum of two (2) feet of freeboard must be maintained at all times.

d. Regular inspections shall be made of the lagoon at a frequency to ensure its proper operation. Any abnormalities shall be recorded in the facility logbook along with a description of any actions taken to correct the problem. Examples of such abnormalities include, but are not limited to: high liquid levels, rapid changes in liquid levels, holes, washouts, liner deterioration, overflows, etc. Discovery of any significant abnormality shall be cause for taking immediate corrective actions and shall also be reported to the Department within 48 hours of discovery;

e. The lagoon shall be completely emptied and the liner subsequently examined for substantial deterioration at least once every 5 years. If substantial deterioration is found, the liner shall be replaced or warrantably repaired.

f. The Permittee shall ensure that any sludges or solid wastes produced during any sedimentation process be treated and disposed of in accordance with the terms of the Solid Waste Management Method in the Permittee's Environmental Compliance Plan, and the treatment and disposal shall be in compliance with all State and County Health Department regulations;

g. The Permittee shall provide that any construction be professionally engineered by a State licensed engineer;

h. The Permittee shall obtain a dam safety permit if the above-ground storage capacity exceeds ten (10) acre-feet;

i. The lagoon shall:

1. Be constructed of a geo-membrane material which is specifically engineered to withstand internal and external pressure gradients, physical contact with wastes, climatic conditions, and stresses of installation and daily operation. The geomembrane material shall meet or exceed the specifications of 30 mil HDPE;

2. Have a continuous inner liner covering the entire inner bottom and sides of the structure that are likely to be in contact with wastewater;

3. Be placed on a base of sand or similar material of a thickness capable of providing adequate support to prevent failure due to settlement, compression, or uplift;

4. Prevent the movement of wastewater chemicals through its structure to waters of the State, or to contact any adjacent ground or soil;

5. Have a life expectancy which must extend at a minimum, through the entire time of this general permit;

6. Have sufficient capacity to maintain a minimum of two (2) feet of vertical depth (freeboard) at all times;

7. Be surrounded by a minimum six (6) foot high fence with a locked gate;

8. Maintain the following minimum setback distances (feet):

	Surface waters of the State, irrigation supply and	Potable water

	drainage ditches, wetlands	wells
Lined lagoons containing DPA	250	250
Lined lagoons without DPA	50	100

Alternatives to geomembrane lined lagoon

The Permittee may alternatively use a warrantable pre-manufactured fiberglass, fiberglass-lined, or metal tank in lieu of the geomembrane lined evaporative lagoon. In this case, the permittee shall be required to comply fully with all the above-listed BMPs and prohibitions, except for 1, 2, and 3 above. Additionally, the tank shall be set above ground.

Rationale for lined evaporation lagoons

There shall normally be no requirement for analyzing any wastestream being discharged to a lined evaporation lagoon: discharge limits shall be the maximum normal use concentrations, and discharge volumes will be limited to not exceed the two-foot freeboard daily minimum monitoring limit. However, sampling shall be conducted on any lagoon discharge (all being prohibited) including, but not limited to, over-topping or leakage. This TDM should adequately protect the ground waters of the State.

2. DUST ABATEMENT APPLICATION

Dust abatement shall only be allowed on unpaved roadways or unpaved bin storage lots. A special **Road Management Plan** (RMP) shall be required for each facility desiring to use this alternative TDM for wastestreams containing either DPA, ligninsulfonate, or chlorine-based chemicals. Any RMP shall not allow for potential or actual contamination of the waters of the State, or violate any other Federal, State, or local regulation.

Table 5. Application Rates, Frequencies, and Allowed Sites for Dust Abatement

WASTESTREAM DESCRIPTION		MAXIMUM APPLICATION RATE and FREQUENCY [1]	ALLOWED SITES
Any permitted wastestream except drencher wastewater		1800 gallons/acre/day 180 times/year	only unpaved bin lots or unpaved roads
Any **drencher** wastewater	Not containing calcium chloride	1800 gallons/acre/day 30 applications/year every other day	
	Containing calcium chloride	1800 gallons/acre/year one (1) application/year	
Pear float tank wastewater with these concentrations of SOPP or other fungicides in (mg/L)	no fungicide	4840 gal/acre, once per week	
	1 to ≤ 1000	4840 gal/acre, once per week	
	1001 to ≤ 2000	2420 gal/acre, once per week	
	2001 to ≤ 3000	1613 gal/acre, once per week	
	3001 to ≤ 4000	1210 gal/acre, once per week	
	4001 to ≤ 5000	968 gal/acre, once per week	
	5001 to ≤ 6000	807 gal/acre, once per week	
	greater than 6000	Discharge Not Allowed	

1. Application rates are valid only if chemical additives concentrations are in compliance with the maximum label use rates specified in Table. 8 of the permit.
2. Apply DPA-containing wastestreams at any rate up to a maximum annual rate of 990 lbs/acre of road surface (the discharge of 1,800 gallons/acre of 2,200 mg/L of DPA, 30 times per year);
3. Apply DPA-containing wastestreams at any rate up to a maximum daily rate of 1,800 gallons/acre of road surface;
4. Apply DPA-containing wastestreams no more frequently than every other day;
5. Apply ligninsulfonate-containing wastestreams at any rate up to a maximum daily rate of 1.3 tons of ligninsulfonate solids/acre (4,840 gallons/acre of 12% ligninsulfonate);
6. Apply ligninsulfonate-containing wastestreams at any rate up to a maximum annual rate of 67.6 tons of ligninsulfonate solids/acre (4,840 gallons/acre of 12% ligninsulfonate, 52 times/year);

Best Management Practices for Dust Abatement

- Do not commingle or apply to the same site any wastestream containing:

    - DPA;
    - Ligninsulfonate;
    - Chlorine or chlorine-containing compounds;

- Maintain, in the log book, accurate and ongoing records to verify that chemical additives are being used at or below the use rate concentrations specified in Table 6 and to ensure that the application of wastewater to each site is in compliance with the required application rates, BMPs, and other permit conditions. The following information shall be kept for all original and make-up batches:

    - Batch ID Number;
    - Date batch was mixed;
    - Person responsible for mix;
    - Total batch volume (gallons);
    - Name and amount of all chemicals added to batch;
    - Date spent solution was discharged;
    - Disposal Site Identification (used to track application to prevent overapplication or improper mixing of wastewater)
    - Volume of spent solution discharged (gallons)
    - Disposal area (acres)
    - Application rate (gallons/acre)
    - Inspection results and comments regarding any abnormal conditions such as ponding, runoff, overland flow, etc. (see Section 5. Inspections).

- Do not commingle process wastestreams with sanitary (domestic) sewage;

- Do not discharge in excess of those specific numerical limits and application rates given in Tables 5, 6, 7, or 8;

- Do not discharge priority pollutants, dangerous wastes, or toxics in toxic amounts;

- No allowance for background levels of contaminants already in the supply water;

- Do not apply at a rate which results in ponding or runoff;

- Not apply to sites where the groundwater table is located within five (5) feet of the soil surface at time of application;

- Do not apply to sites which are frozen, snow-covered, saturated, flooded, or when anaerobic conditions exist;

- Provide sufficient self-contained storage capacity for all wastewaters during any time period when application cannot be properly achieved (i.e., when application site is saturated, flooded, or frozen). This self-contained storage shall meet the requirements in the Lined Evaporative Lagoon TDM;

- Treat and dispose of any sludges or solid wastes produced during any sedimentation process in accordance with the terms of the Solid Waste Management Plan in the Permittee's Environmental Compliance Plan and in compliance with all State and County Health Department regulations;

- Do not apply to sites within wellhead protection boundaries.

- Maintain the following Minimum Setback Distances (Feet):

	Surface Waters of the State [1]	Potable water supply well
Lined sedimentation or storage lagoons containing DPA	250	250
Lined sedimentation or storage lagoons without DPA	50	100
Dust abatement application sites	50	100

[1] Includes lakes, rivers, streams, irrigation supply ditches, drainage ditches, wetlands.

Inspections

Inspections shall be made of the application site immediately after each application. Any abnormalities shall be recorded either in the facility logbook or the Road Management Plan, along with a description of any actions taken to correct any problems. Examples of such abnormalities include, but are not limited to ponding and runoff or overland flow. Discovery of any significant abnormality shall be cause for taking immediate corrective action and shall also be reported to the Department within 48 hours of discovery.

Road Management Plan (RMP)

Prior to any discharge and for each separate dust abatement application site, an RMP shall be developed and retained on-site. The following wastestreams must have separate application sites and RMPs: 1. Wastewater containing ligninsulfonate; 2. Wastewater containing DPA; or 3. Wastewater with chlorine or chlorine-containing compounds. Each RMP shall, at a minimum, include:

1. A copy of proof of ownership of the application site, or a legally binding written agreement with the legal owner to use the site for wastewater treatment and disposal;

2. An application site description including, at a minimum:
   - The location of the application site;
   - A map indicating the site boundaries;
   - A brief description of the geology and topography of the site and its immediately surrounding areas indicating its suitability as an application site;
   - The surface material and composition of the site, i.e. dirt road or gravel bin lot; and
   - The total surface area of the application site.

3. An operational plan including, at a minimum:
   - The proposed total maximum daily and annual application rates expressed as gallons/acre/day and gallons/acre/year;
   - The maximum use concentration of the active ingredient(s) (DPA; Ethoxyquin, calcium chloride, ligninsulfonate, etc.) in the wastewaters to be applied; and
   - The proposed application schedule and operational methodology to be followed throughout the duration of this general permit.

Rationale for dust abatement effluent limits and application rate limits:

1. BOD_5: No monitoring for BOD will be required for wastewater discharges to dust application. These discharges, other that those containing ligninsulfonate, typically have BOD_5 concentrations less than 500 mg/L. Combined with the maximum daily application rate of 1800 gallons/acre, this results in BOD_5 loadings of less than 7.5 lbs/acre/day, which BPJ suggests should be protective of groundwater.

BPJ suggests that BOD_5 from pear float solutions containing ligninsulfonate is best controlled using proper solution preparation, application rates, and BPMs. Ligninsulfonate solutions shall not exceed the normal use rate of 12% (120,000 mg/L), of which 50% or 60,000 mg/L are solids. With a BOD_5 to solids ratio of 0.3 to 1, this results in a maximum BOD limit of 18,000 mg/L.

BPJ suggests that the following two application rates not be exceeded: a maximum annual rate of 67.6 tons of ligninsulfonate solids/acre, and a maximum daily rate of 1.3 tons of ligninsulfonate solids/acre. This limit is anticipated to protect the ground water of the State based on the following manufactures' recommendations: (1) suggested maximum application rate of 50 tons of ligninsulfonate solids/acre; and (2) dust abatement application rate 1.3 tons of ligninsulfonate solids/acre[15]. This dust abatement daily application rate of 1.3 tons solids/acre, when using the normal use concentration of 6% solids (60,000 mg/L), calculates to approximately 1.0 gallons/square yard or 4,840 gallons/acre. This is in line with the manufactures' recommendation for dust abatement application of 0.25 gallon per square yard of a 25% solids solution.

BPJ suggests the application frequency intervals be long enough to allow time for biological degradation to occur. Application intervals were chosen (Table 4.) that would result in application rates approximating the one time application of 60 tons of solids per acre that was reported to pose no threat of groundwater contanimation.[15] Additional soil and groundwater monitoring will be required for the higher frequencies.

TABLE 6. APPLICATION FREQUENCIES AND MONITORING FOR WASTEWATER CONTAINING LIGNINSULFONATE

IF THE ANNUAL APPLICATION RATE IS (TONS OF SOLIDS/ACRE)	WHICH IS A RATE EQUIVALENT TO	YOU MUST DO THIS ADDITIONAL REQUIRED MONITORING	AT THIS MONITORING FREQUENCY
0 TO 15.6	Applying 4840 gal/acre of 12% ligninsulfonate wastewater once every 30 days	None	N/A
> 15.6 to 33.8	Applying 4840 gal/acre of 12% ligninsulfonate wastewater once every 14 days	Test subsoil with dipyridyl at 12-inch depth within the lowest part of the application site where ponding may occur for the presence of Fe^{+2} ions.	Quarterly
> 33.8 to 67.6	Applying 4840 gal/acre of 12% ligninsulfonate wastewater once every 7 days	Install a downgradient monitoring well to test groundwater for BOD_5 and with dipyridyl for the presence of Fe^{+2} ions.	Monthly

The Permittee shall determine at which of the preceding three annual application rates any ligninsulfonate wastewater will be applied to the dust abatement site at the facility. The Permittee shall record in the RMP or Facility Logbook the application rate and results of all required soil and groundwater monitoring.

The Department shall approve any groundwater monitoring site prior to any installation of a groundwater monitoring well.

No other TDM shall be allowed for float or flume wastestreams containing ligninsulfonate under the general permit due to the extremely high BOD and TSS content of these wastewaters. Both maximum limits shall remain in force for the life of the general permit unless scientific evidence becomes available indicating that a different limit may be allowed. The general permit may then be modified accordingly.

2. **CAPTAN® or DICHLORAN®:** BPJ suggests that both Captan® and Dichloran® should be controlled by in-house procedures. Their discharge limits will be equal to the dangerous waste regulations calculated maximum concentration of 10.0 mg/L.

3. **DPA-containing wastestreams:** BPJ suggests that DPA should be controlled by in-house procedures. The discharge limit will be equal to the maximum normal use concentration of 2,200 mg/L. BPJ suggests a maximum daily application rate of 1,800 gallons/acre, no more frequent than every other day, with a maximum of 30 applications per year to a single site. This is equivalent to an annual application rate of 990 lbs of DPA/acre. The maximum annual and daily rates were derived using data collected by Gray & Osborne, Inc. during a soil column study in late 1993. These maximum rates and frequencies shall remain in force for the life of the general permit unless scientific evidence becomes available indicating that a different limit may be allowed. The general permit may then be modified accordingly.

   The only required analysis for drencher wastewater containing DPA will be an annual verification of the chemical additive concentrations, if the Permittee complies with all the terms and conditions of the general permit. The Permittee shall record, for each batch; 1) batch number, 2) date the batch was mixed, 3) person responsible for making the batch, 4) total batch volume, 5) name and amount of all chemicals added to the batch, 6) date spent solution was discharged, 7) disposal site ID, 8) volume of spent solution discharged, 9) disposal area, 10) calculated application rate, and 10) TDM inspection results and comments about any abnormal conditions.

4. **Ethoxyquin®:** BPJ suggests that Ethoxyquin® should be controlled by in-house procedures. The discharge limit will be equal to the maximum normal use concentration of 2,700 mg/L, no more frequent than every other day, with a maximum of 30 applications per year to a single site. The only required analysis for ethoxyquin-containing drencher wastewater will be an annual verification of the chemical additive concentrations, if the Permittee complies with all the terms and conditions of the general permit. The Permittee shall record, for each batch, the same information as required for drencher wastewater containing DPA.

5. **pH:** BPJ suggests that this parameter should be controlled by in-house procedures. Discharge pH shall be maintained in the range of 6.0 to 9.0.

6. **ROVRAL®:** BPJ suggests that ROVRAL® should be controlled by in-house procedures. The discharge limit will be equal to the dangerous waste regulations calculated maximum concentration of 1,000 mg/L.

7. **Sodium silicate:** BPJ suggests that sodium silicate should be controlled by in-house procedures. The discharge limit will be equal to the maximum normal use concentration of 30,000 mg/L. Analysis of this parameter will not be required for this TDM, if the Permittee complies with all the terms and conditions of the general permit. BPJ suggests that any application rate (not concentration) which does not produce runoff or ponding

will be permitted. However, these wastestreams will need to be neutralized to an acceptable pH range (6 to 9) prior to application.

8. **SOPP:** BPJ suggests that SOPP should be controlled by in-house procedures. The discharge limit will be equal to the dangerous waste regulations calculated maximum concentration of 1,000 mg/L. The formula for calculating application rates for SOPP concentrations greater than 1000 mg/l is:

$$\text{Rate}_{SOPP>1000} = \frac{\text{Rate}_{SOPP<1000} \text{ X SOPP Effluent Limit (mg/l)}}{\textbf{Actual SOPP concentration}}$$

$$= \frac{4840 \text{ gal/ac X } 1000 \text{ mg/l}}{\text{Actual SOPP concentration}}$$

9. **TBZ:** BPJ suggests that TBZ should be controlled by in-house procedures. The discharge limit will be equal to the maximum normal drencher use concentration of 500 mg/L, no more frequent than every other day, with a maximum of 30 applications per year to a single site. The only required analysis for ethoxyquin-containing drencher wastewater will be an annual verification of the chemical additive concentrations, if the Permittee complies with all the terms and conditions of the general permit. The Permittee shall record, for each batch, the same information as required for drencher wastewater containing DPA.

10. **Total chloride:** BPJ suggests that total chloride should be controlled by in-house procedures. The discharge limit will be 250.0 mg/L , the State's ground water quality standard, for wastewater which does not contain calcium chloride. For wastewater discharges containing calcium chloride, analysis of this parameter will not be required for this TDM, if the Permittee complies with all the terms and conditions of the general permit. This includes the use of calcium chloride at concentrations no greater than the label rate of 2200 mg/L and a maximum annual application rate of 1800 gallons per acre. See the discussion of calcium chloride in the “Chemicals Used” section of this fact sheet for more details on the derivation of these use and application limits.

11. **Total residual chlorine (TRC):** BPJ suggests that TRC should be controlled by in-house procedures. The discharge limit will be equal to the dangerous waste regulations calculated maximum concentration of 10.0 mg/L.

12. **TOPSIN®:** BPJ suggests that Topsin® should be controlled by in-house procedures. The discharge limit will be equal to the maximum normal use concentration of 840 mg/L. Analysis of this parameter will not be required for this TDM, if the Permittee complies with all the terms and conditions of the general permit.

3. POTW

Wastewater discharged to a POTW will be subject to special BMPs and prohibitions anticipated to be protective of all POTWs. These treatment systems operate on a biological-based design, and therefore any slug load of pollutants has the potential to disrupt those operations. Since there have been past instances of POTW upsets directly attributable to the fresh fruit packing industry, these specialized BMPs and prohibitions are required.

The effluent limits, monitoring, and best management practices contained in this permit may be modified by any stricter conditions imposed by a POTW. Compliance with the terms of this permit does not relieve the permittee from the responsibility to comply with any contract or agreement with the POTW or for responsibility for any contamination, pass-through, or upset of a POTW related to the discharge of any facility wastewater.

In addition to other BMPs, a POTW or on-site sewage treatment device TDM shall:

1. Obtain written certification from the receiving POTW accepting the facility's wastewater. The certification form is contained in the Application for Coverage;
2. Comply fully with all applicable pretreatment standards including, but not limited to, the following:
   a. General Pretreatment Regulations 40 CFR Part 403;
   b. Any stricter local municipal sewer use ordinance; and
   c. Any stricter local health district regulations;
3. Not discharge in excess of those specific numerical limits given in Table ?;
4. Not discharge priority pollutants, dangerous wastes, or toxics in amounts toxic to a treatment system; and
5. Not commingle sanitary (domestic) sewage with any process wastewater discharge which is prohibited, toxic, or otherwise detrimental to sewage treatment facilities or processes.

Rationale for POTW discharge pollutant limitations:

1. **BOD_5:** BPJ suggests that the discharge limit should be 500.0 mg/L. This represents a limit approximately twice as great as typical average domestic sewage (250.0 mg/L BOD_5). Domestic sewage BOD_5 concentrations have reached 500 mg/L with no substantial disruption of POTW activities. This limit will adequately protect any POTW from slug load disruption.

2. **Ethoxyquin®:** BPJ suggests that Ethoxyquin® should be controlled by in-house procedures. The discharge limit will be equal to 50.0 mg/L which takes into consideration the toxicity of Ethoxyquin®.

3. **pH:** BPJ suggests that this parameter should be maintained in the range of 6.0 to 9.0.

4. **Rovral:** BPJ suggests that Rovral® should be controlled by in-house procedures. The discharge limit will be equal to 23.0 mg/L which takes into consideration the toxicity of Rovral®.

5. **SOPP:** BPJ suggests that SOPP should be controlled by in-house procedures. The discharge limit will be equal to 50.0 mg/L which takes into specific consideration the toxicity of SOPP.

6. **TBZ:** BPJ suggests that TBZ should be controlled by in-house procedures. The discharge limit will be equal to 50 mg/L which takes into specific consideration the toxicity of TBZ.

7. **Topsin:** BPJ suggests that Topsin® should be controlled by in-house procedures. The discharge limit will be equal to 44.0 mg/L which takes into specific consideration the toxicity of Topsin®.

8. **Total chloride:** BPJ suggests that total chloride should be controlled by in-house procedures. The discharge limit will be 250.0 mg/L (the State's ground water quality standard) which takes into specific consideration the protection of the waters of the State and that no substantial treatment would occur.

9. **Total residual chlorine (TRC):** BPJ suggests that TRC should be controlled by in-house procedures. The discharge limit will be 0.50 mg/L which takes into specific consideration the toxicity of chlorine.

10. **Total sulfate:** BPJ suggests that total sulfate should be controlled by in-house procedures. The discharge limit will be 250.0 mg/L (the State's ground water quality standard) which takes into specific consideration the protection of the waters of the State and that no substantial treatment would occur in the POTW.

11. **TSS:** BPJ suggests that the discharge limit should be 500.0 mg/L. This represents a limit approximately twice as great as typical average domestic sewage (250.0 mg/L TSS). Domestic sewage TSS concentrations have reached this quantity with no substantial disruption of POTW activities. This limit will adequately protect any POTW from slug load disruption.

4. LAND APPLICATION

Land application uses an engineered system for applying wastewater to a vegetated land surface with the applied wastewater being treated by the chemical, biological, and physical processes as it flows through the plant-soil matrix. It is analogous to the slow rate land treatment process in the EPA Process Design Manual and Supplement for the Land Treatment of Municipal Wastewater (EPA 625/1-81-013 and –013a). This design manual or other relevant Department approved documents (i.e. Guidelines for Preparation of Engineering Reports for Industrial Wastewater Land Application Systems, Department of Ecology Publication #93-36) shall be used as guidance for designing land application systems. Such systems consists of a land application site, a distribution system for evenly distributing the wastewater, and a lined lagoon (or other Department approved, self-contained storage system) for storing wastewater during periods when it cannot be land applied. There are various distribution systems for land applying wastewaters including: sprinkler, furrow, and subirrigation. Each method has its respective application for specific nutrients. The furrow method has significantly higher percolation (leaching) rates than the other two irrigation methods. The subirrigation method has the least percolation but is also the most expensive method and was determined prone to fouling[13]. Sprinkler (sprayfield) irrigation has been determined by the Department to be the most appropriate land application system for a number of the wastewaters from the fruit packing industry. A successful land application project will achieve a level of wastewater treatment that will not result in violations of groundwater or surface water quality standards. The Department has determined that land application satisfies as AKART only after satisfactorily complying with, at least, all of the BMPs and prohibitions listed below.

In addition to other BMPs, a land application TDM shall:

- Do not commingle or apply to the same site any wastestream containing:
    - DPA;
    - Ligninsulfonate;
    - Chlorine or chlorine-containing compounds;

- Apply DPA-containing wastestreams only to unirrigated non-crop lands and at any rate up to a maximum annual rate of 990 lbs/acre (the discharge of 1,800 gallons/acre of 2,200 mg/l of DPA, 30 times per year). The use of unirrigated non-crop lands is to prevent the DPA from being washed down into the ground before it has been degraded by the UV light from the sun;

- Apply DPA-containing wastestreams only to unirrigated non-crop lands and at any rate up to a maximum daily rate of 1,800 gallons/acre;

- Maintain, in the log book, accurate and ongoing records to verify that chemical additives are being used at or below the use rate concentrations specified in Table 12 of the permit and to ensure that the application of wastewater to each site is in compliance with the required

application rates, BMPs, and other permit conditions. The following information shall be kept for all original and make-up batches:

- Batch ID Number;
- Date batch was mixed;
- Person responsible for mix;
- Total batch volume (gallons);
- Name and amount of all chemicals added to batch;
- Date spent solution was discharged;
- Disposal Site Identification (used to track application to prevent overapplication or improper mixing of wastewater)
- Volume of spent solution discharged (gallons)
- Disposal area (acres)
- Application rate (gallons/acre)
- Inspection results and comments regarding any abnormal conditions such as ponding, runoff, overland flow, etc. (see Section 5. Inspections).

- Do not commingle process wastestreams with sanitary (domestic) sewage;

- Do not discharge in excess of those specific numerical limits and application rates given in Tables 10,11, or 12 of the permit;

- Do not discharge priority pollutants, dangerous wastes, or toxics in toxic amounts;

- No allowance for background levels of contaminants already in the supply water;

- Do not apply at a rate which results in ponding or runoff;

- Do not apply wastewater at rates with will exceed the published agronomic rates for the crop being applied to.

- If needed, properly install, operate and maintain a lined sedimentation pond or other Department approved treatment, designed to pretreat the wastewater to prevent violation of the TSS effluent limit and prevent plugging of the wastewater distribution system;

- Not apply to sites where the groundwater table is located within five (10) feet of the soil surface at time of application;

- Do not apply to sites which are frozen, snow-covered, saturated, flooded, or when anaerobic conditions exist;

- Provide sufficient self-contained storage capacity for all wastewaters during any time period when application cannot be properly achieved (i.e., when application site is saturated,

flooded, or frozen). This self-contained storage shall meet the requirements in the Lined Evaporative Lagoon TDM;

- Treat and dispose of any sludges or solid wastes produced during any sedimentation process in accordance with the terms of the Solid Waste Management Plan in the Permittee's Environmental Compliance Plan and in compliance with all State and County Health Department regulations;

- Do not apply to sites within wellhead protection boundaries.

- Maintain the following Minimum Setback Distances (Feet):

	Surface Waters of the State [1]	Potable water supply well
Lined sedimentation or storage lagoons containing DPA	250	250
Lined sedimentation or storage lagoons without DPA	50	100
Land application sites	50	100

[1] Includes lakes, rivers, streams, irrigation supply ditches, drainage ditches, wetlands.

- Provide a copy of some proof of ownership of the application site, or otherwise, a written agreement with the legal owner to use the site throughout the duration of this permit for wastewater treatment/disposal;

- Prohibit livestock from grazing on the application site.

Inspections

Inspections shall be made of the application site immediately after each application. Any abnormalities shall be recorded in the facility logbook along with a description of any actions taken to correct the problems. Examples of such abnormalities include, but are not limited to: abnormal crop growth or quality, ponding, runoff, or overland flow. Discovery of any significant abnormality shall be cause for taking immediate corrective actions and shall also be reported to the Department within 48 hours of discovery.

Rationale for land application effluent limits and application rate limitations

1. **Permitted wastestreams, excluding DPA-containing wastestreams:** BPJ suggests that application rate shall not exceed the published agronomic flow rate for that crop species or orchard land being applied to.

2. **DPA-containing wastestreams:** DPA-containing wastestreams shall only be applied to non-irrigated non-crop lands as suggested by the Washington State Department of Agriculture (WDOA). BPJ suggests that DPA should be controlled by in-house procedures. The discharge limit will be equal to the maximum normal use concentration of 2,200 mg/L. BPJ suggests a maximum daily application rate of 1,800 gallons/acre, no more frequent than every other day, with a maximum of 30 applications per year to a single site. This is equivalent to an annual application rate of 990 lbs of DPA/acre. The maximum annual and daily rates were derived using data collected by Gray & Osborne, Inc. during a soil column study in late 1993. These maximum rates and frequencies shall remain in force for the life of the general permit unless scientific evidence becomes available indicating that a different limit may be allowed. The general permit may then be modified accordingly.

   The only required analysis for drencher wastewater containing DPA will be an annual verification of the chemical additive concentrations, if the Permittee complies with all the terms and conditions of the general permit. The Permittee shall record, for each batch; 1) batch number, 2) date the batch was mixed, 3) person responsible for making the batch, 4) total batch volume, 5) name and amount of all chemicals added to the batch, 6) date spent solution was discharged, 7) disposal site ID, 8) volume of spent solution discharged, 9) disposal area, 10) calculated application rate, and 10) TDM inspection results and comments about any abnormal conditions.

3. **BOD_5:** BPJ suggests that for wastewater discharges to land application, BOD_5 can be adequately controlled through the use of a tiered maximum daily application rate schedule which is based upon the actual BOD_5 concentration in the wastewater. Based upon experience with fruit juice processor wastewater discharges to sprayfields, BPJ suggests 10 lbs/acre/day of **soluble** BOD_5 is a safe maximum loading rate. Using this loading rate and the following formula a tiered application rate schedule can be calculated.

   Concentration (C) = Volume (V) x Mass (M) or solving for V

   $$V = M / C$$

   Where :
   V = Maximum Daily Application Rate in gallons/acre/day
   M = Target BOD_5 loading rate of 10 lbs/acre/day
   C = Actual BOD_5 concentration in the wastewater in mg/L

   Example: For wastewater with a BOD_5 of 200 mg/L

   $$\text{Maximum Daily Application Rate} = \frac{(10 \text{ lbs/ac/day}) \times (453.6 \text{ gr/lb}) \times (1000 \text{ mg/gr}) \times (0.264 \text{ gal/L})}{(200 \text{ mg/L})}$$

= 5987.5 gallons/acre/day
≅ 6000 gal/ac/day

ACTUAL BOD_5 CONCENTRATION IN THE WASTEWATER (mg/L)	MAXIMUM DAILY APPLICATION RATE (gallons/acre/day)	MAXIMUM APPLICATION FREQUENCY
0 to 200	6000	every other day
201 to 400	3000	every other day
401 to 600	2000	every other day
greater than 600	DISCHARGE NOT ALLOWED	

. Assuming 200 days of application per year, the maximum annual application rate will be 1,200,000 gallons/acre/year, which is equivalent to 44.2 inches/year. This is within the range of published agronomic irrigation rates for orchards and pasture.

3. CAPTAN® or DICHLORAN®: BPJ suggests that both CAPTAN® and DICHLORAN® should be controlled by in-house procedures. The discharge limit will be equal to the dangerous waste regulations calculated maximum concentration of 10.0 mg/L.

4. Ethoxyquin®: BPJ suggests that Ethoxyquin® should be controlled by in-house procedures. The discharge limit will be equal to the maximum normal use concentration of 2700 mg/L, no more frequent than every other day, with a maximum of 30 applications per year to a single site. The only required analysis for ethoxyquin-containing drencher wastewater will be an annual verification of the chemical additive concentrations, if the Permittee complies with all the terms and conditions of the general permit. The Permittee shall record, for each batch, the same information as required for drencher wastewater containing DPA.

5. pH: BPJ suggests that this parameter should be controlled by in-house procedures. Discharge pH shall be maintained in the typical range of 6.0 to 9.0.

6. ROVRAL®: BPJ suggests that ROVRAL® should be controlled by in-house procedures. The discharge limit will be equal to the dangerous waste regulations calculated maximum concentration of 1,000 mg/L.

7. Sodium silicate: BPJ suggests that sodium silicate should be controlled by in-house procedures. The discharge limit will be equal to the maximum normal use concentration of 30,000 mg/L. Analysis of this parameter will not be required for this TDM, if the Permittee complies with all the terms and conditions of the general permit.

8. SOPP: BPJ suggests that SOPP should be controlled by in-house procedures. The discharge limit will be equal to the dangerous waste regulations calculated maximum concentration of 1,000 mg/L.

9. TBZ: BPJ suggests that TBZ should be controlled by in-house procedures. The discharge limit will be equal to the maximum normal drencher use concentration of 500 mg/L, no more frequent than every other day, with a maximum of 30 applications per year to a single site. The only required analysis for ethoxyquin-containing drencher wastewater will be an annual

verification of the chemical additive concentrations, if the Permittee complies with all the terms and conditions of the general permit. The Permittee shall record, for each batch, the same information as required for drencher wastewater containing DPA.

10. **Total chloride:** BPJ suggests that total chloride should be controlled by in-house procedures. The discharge limit will be 250.0 mg/L , the State's ground water quality standard, for wastewater which does not contain calcium chloride. For wastewater discharges containing calcium chloride, analysis of this parameter will not be required for this TDM, if the Permittee complies with all the terms and conditions of the general permit. This includes the use of calcium chloride at concentrations no greater than the label rate of 2200 mg/L and at maximum annual application rate of 1800 gallons per acre. See the discussion of calcium chloride in the "Chemicals Used" section of this fact sheet for more details on the derivation of these use and application limits.

11. **Total dissolved solids (TDS):** BPJ suggests that TDS can be measured directly and should be controlled by in-house procedures. The discharge limit will be 500.0 mg/L which takes into specific consideration the lack of degradation in soil and the protection of the waters of the State.

12. **Total residual chlorine (TRC):** BPJ suggests that TRC should be controlled by in-house procedures. The discharge limit will be equal to the dangerous waste regulations calculated maximum concentration of 10.0 mg/L.

13. **Total sulfate:** BPJ suggests that total sulfate should be controlled by in-house procedures. The discharge limit will be 250.0 mg/L which takes into specific consideration the probable lack of degradation in soil and the protection of the waters of the State.

14. **TOPSIN®:** BPJ suggests that TOPSIN® should be controlled by in-house procedures. The discharge limit will be equal to the maximum normal use concentration of 840.0 mg/L. Analysis of this parameter will not be required for this TDM, if the Permittee complies with all the terms and conditions of the general permit.

15. **TSS:** BPJ suggests that the TSS discharge limit should be the same tiered application rates as discussed in the BOD_5 section.

5. PERCOLATION LAGOONS OR DITCHES

The TDM of discharging wastewaters to percolation lagoons or ditches will be strictly reviewed before being permitted. The Department is required by law to protect the State's ground waters, and so fruit packing wastewater discharges shall, at a minimum, comply with all of the State's ground water quality standards. The Department may require ground water monitoring and an individual permit at percolation sites if the potential for contamination is suspected. This approach is substantiated by an investigation sponsored by one fresh fruit packer[18] which found that:

* "Tests of leachate from the soil column tests yielded higher [concentrations of] mineral salts than found in [percolation] pond wastewater influent." and

* "Depending on dilution available, these constituents could impact the quality of underlying groundwaters."

Percolation systems are engineered systems for treatment of wastewater as it percolates through the soil matrix. The system is designed with loading rates to provide for alternating wet and dry cycles. It is analogous to the rapid infiltration land treatment process in the EPA Process Design Manual and Supplement for the Land Treatment of Municipal Wastewater (EPA 625/1-81-013 and –013a). This design manual or other relevant Department approved documents shall be used as guidance for designing land application systems.

For this TDM, the Permittee shall:

1. Properly install, operate and maintain groundwater monitoring wells and apply for and obtain an individual permit, if any groundwater contamination is detected or suspected by the Department;
2. If needed, properly install, operate and maintain a lined sedimentation pond or other Department-approved treatment, designed to pretreat the wastewater to prevent violation of the TSS effluent limit and prevent plugging of the percolation system;
3. The Permittee shall ensure that any sludges or solid wastes produced during any sedimentation process be treated and disposed of in accordance with the terms of the Solid Waste Management Method in the Permittee's Environmental Compliance Plan, and the treatment and disposal shall be in compliance with all State and County Health Department regulations;
4. Not discharge in excess of those specific numerical limits given in S5E;
5. Not discharge priority pollutants, dangerous wastes, or toxics in toxic amounts;
6. Not have any allowance for background levels of contaminants already in the supply water;
7. Not apply to sites where groundwater table is located within ten (10) feet from the soil surface;
8. Not build impoundments or apply to sites less than fifty (50) feet from surface waters of the State, wetlands, or irrigation supply ditches;

9. Not build impoundments or apply to sites less than one-hundred (100) feet from potable water wells;
10. Not apply to sites within wellhead protection boundaries;

Rationale for percolation system pollutant limitations

1. **BOD_5:** BPJ suggests that the discharge limit will be 100.0 mg/L. This represents a 50% reduction (safety margin) of the most conservative limit as indicated in the Department's Guidelines for Land Application[26].

2. **Ethoxyquin®:** BPJ suggests that Ethoxyquin® should be controlled by in-house procedures. The discharge limit will be equal to 5.00 mg/L which takes into specific consideration both the toxicity of Ethoxyquin® and the protection of the waters of the State.

3. **pH:** BPJ suggests that this parameter shall be maintained in the range of 6.0 to 9.0.

4. **ROVRAL®:** BPJ suggests that ROVRAL® should be controlled by in-house procedures. The discharge limit will be equal to 4.00 mg/L which takes into specific consideration both the toxicity of ROVRAL® and the protection of the waters of the State.

5. **SOPP:** BPJ suggests that SOPP should be controlled by in-house procedures. The discharge limit will be equal to 6.00 mg/L which takes into special consideration both the toxicity of SOPP and the protection of the waters of the State.

6. **TBZ:** BPJ suggests that TBZ should be controlled by in-house procedures. The discharge limit will be equal to 10.00 mg/L which takes into specific consideration both the toxicity of TBZ and the protection of the waters of the State.

7. **Total chloride:** BPJ suggests that total chloride should be controlled by in-house procedures. The discharge limit will be equal to 250.0 mg/L which takes into specific consideration the protection of the waters of the State.

8. **Total dissolved solids (TDS):** BPJ suggests that TDS should be controlled by in-house procedures. The discharge limit will be 500.0 mg/L which takes into specific consideration the protection of the waters of the State.

9. **Total residual chlorine (TRC):** BPJ suggests that TRC should be controlled by in-house procedures. The discharge limit will be equal to 5.00 mg/L which takes into specific consideration both the protection of the waters of the State and its degradation aspects.

10. **Total sulfate:** BPJ suggests that total sulfate should be controlled by in-house procedures. The discharge limit will be equal to 250.0 mg/L which takes into special consideration the protection of the waters of the State.

11. **TOPSIN®:** BPJ suggests that TOPSIN® should be controlled by in-house procedures. The discharge limit will be equal to 7.80 mg/L which takes into specific consideration both the toxicity of TOPSIN® and the protection of the waters of the State.

12. **TSS:** BPJ suggests that the discharge limit should be 100.0 mg/L. This represents a 50% reduction (safety margin) of the most conservative limit as indicated in the Department's Guidelines for Land Application[26]. This is intended to compensate for the higher probability of leaching and thus ground water contamination, than from land application.

6. SURFACE WATERS

Setting Effluent Limits

Federal and State regulations require that effluent limitations set forth in a NPDES permit must be either technology- or water quality-based. Technology-based limitations are based upon the treatment methods available to treat specific pollutants. Technology-based limitations are set by regulation or developed on a case-by-case basis (40 CFR 125.3, and Chapter 173-220 WAC). Water quality-based limitations are based upon compliance with the Surface Water Quality Standards (Chapter 173-201A WAC), Ground Water Standards (Chapter 173-200 WAC), Sediment Quality Standards (Chapter 173-204 WAC) or the National Toxics Rule (Federal Register, Volume 57, No. 246, Tuesday, December 22, 1992). The more stringent of these two limits must be chosen for each of the parameters of concern.

"Numerical" water quality criteria are numerical values set forth in the State of Washington's Water Quality Standards for Surface Waters (Chapter 173-201A WAC). They specify the levels of pollutants allowed in a receiving water while remaining protective of aquatic life. Numerical criteria set forth in the Water Quality Standards are used along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limitations, they must be used in a permit.

In order to protect existing water quality and preserve the designated beneficial uses of Washington's surface waters, WAC 173-201A-060 states that waste discharge permits shall be conditioned such that the discharge will meet established Surface Water Quality Standards. The Washington State Surface Water Quality Standards (Chapter 173-201A WAC) is a state regulation designed to protect the beneficial uses of the surface waters of the state.
Fruit packing wastewater discharges shall, at a minimum, comply with all of the State Surface Water Quality Standards. There will be no allowance for background levels of contaminants already in either the receiving or supply water. Industry discharges to State surface waters must necessarily be absent of or extremely low in deleterious materials. If no numerical limit for any non-conventional pollutant can be found in chapter 173-201A WAC, then there shall not be allowed any detectable effluent concentration of that contaminant. The Department has determined that the major discharge contaminant problems facing the State's surface waters from the fresh fruit packing industry typically relate to BOD_5, temperature, pH, TSS, aesthetic values, and/or toxic and deleterious materials.

Mixing Zone

No mixing or dilution zone shall be authorized to the Permittee for any discharge to surface waters under this general permit.

Antidegradation Of Surface Waters

The State of Washington's Antidegradation Policy requires that discharges into a receiving water shall not further degrade the existing water quality of the water body. In cases where the natural conditions of a receiving water are of lower quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. Similarly, when the natural conditions of a receiving water are of higher quality than the criteria assigned, the natural conditions shall constitute the water quality criteria. More information on the State Antidegradation Policy can be obtained by referring to WAC 173-201A-070.

There is a reasonable expectation that all of the facilities currently under coverage of this general permit that have surface water discharges are satisfying the antidegradation requirements for surface waters of the state of Washington. At the time the permit was issued no facilities were discharging to a water body listed for turbidity in the 1998 303(d) candidate list. No facilities were discharging to a Water Quality Preservation Area (WQPA). There were approximately 60 facilities discharging to 303(d) candidate list water bodies for temperature and/or dissolved oxygen (DO). Of these 85% were discharging NCCW only. The parameters of concern in wastewater discharges from the fresh fruit packing industry with regard to antidegradation are BOD, TSS, pH, Total Residual Chlorine (TRC), chlorides, temperature, and toxics. The general permit was written with the assumption that compliance with all the terms and conditions would result in the reasonable expectation that the antidegradation requirements for the state of Washington would be met. The bases for these assumptions are included in the discussions of rationale for setting the effluent limits.

Discharges to surface waters will not be allowed under this general permit if either 1) the water body is designated as a WQPA, or 2) the effluent exceeds a water quality criterion and the receiving water is on the most current 303(d) list for that criterion. For Condition 2 the facility must either select an alternative TDM or apply for coverage under an individual NPDES permit. Should later evidence indicate that the antidegradation requirements for surface waters are not being met, this permit may be modified to provide more stringent effluent limits, best management practices, or other permit conditions. As with any permit modification, the process will include an opportunity for industry and public review and input.

Allowed Discharges to Surface Water

The discharge of fruit packing wastewaters directly to surface waters of the State is only authorized for the following wastestreams:

1. Float tank or flume wastewater containing no chemical additives at all, or only chlorine-based disinfectants (i.e., chlorine gas, chlorine dioxide, sodium hypochlorite);
2. Processing line wastewater containing no chemical additives at all, or only chlorine-based disinfectants; or
3. NCCW system wastewater containing no priority pollutants, dangerous wastes, or toxics in toxic amounts.

Best Management Practices for Discharges to Surface Waters

1. Comply with all of the State water quality standards for surface waters, chapter 173-201A WAC;
2. Properly install, operate and maintain a lined sedimentation device constructed to provide, at a minimum, one (1) full hour of detention time for sedimentation of process wastewaters except NCCW-only wastestreams, or another Department-approved measure;
3. The Permittee shall ensure that any sludges or solid wastes produced during any sedimentation process be treated and disposed of in accordance with the terms of the Solid Waste Management Method in the Permittee's Environmental Compliance Plan, and the treatment and disposal shall be in compliance with all State and County Health Department regulations;
4. Record and submit monthly all monitoring data, for any discharges containing process water, on an applicable Discharge Monitoring Report (DMR) form;
5. Monitor quarterly and submit on the applicable Yearly Facility Report all NCCW-only discharges;
6. Not discharge in excess of those specific numerical limits given in Condition S5(A)(6);
5. Not discharge priority pollutants, dangerous wastes, or toxics in toxic amounts; and
6. Not have any allowance for background levels of contaminants already in either the receiving or supply water.

Rationale for surface water pollutant limitations

BOD_5

BPJ suggests that the secondary treatment standards be used to limit this parameter to a maximum of 30.0 mg/L. This limit is intended to protect human health and any other beneficial use of surface waters.

To determine if this will satisfy antidegradation, an analysis of DO sag on a biased scenario was done. This biased scenario used a large process water discharge (200,000 gpd or 0.3 cfs) into a small stream at low flow conditions (3.0 cfs). A discharge with a BOD_5 at the maximum effluent limit concentration of 30 mg/L would be diluted to 3 mg/L. BPJ reasonably suggests this will be sufficient to protect background DO levels. The following Streeter-Phelps analysis shows the critical DO for this biased scenario is 8.06 mg/L, which exceeds the minimum criteria of 8.0 mg/l.

Streeter-Phelps analysis of critical dissolved oxygen sag.

Based on Lotus File DOSAG2.WK1 Revised 19-Oct-93

INPUT

1. EFFLUENT CHARACTERISTICS	
Discharge (cfs):	0.06
CBOD5 (mg/L):	30
NBOD (mg/L):	0.6
Dissolved Oxygen (mg/L):	3
Temperature (deg C):	20
2. RECEIVING WATER CHARACTERISTICS	
Upstream Discharge (cfs):	1
Upstream CBOD5 (mg/L):	5.0
Upstream NBOD (mg/L):	0.1
Upstream Dissolved Oxygen (mg/L):	9
Upstream Temperature (deg C):	20
Elevation (ft NGVD):	1540
Downstream Average Channel Slope (ft/ft):	0.007
Downstream Average Channel Depth (ft):	1
Downstream Average Channel Velocity (fps):	1
3. REAERATION RATE (Base e) AT 20 deg C (day^-1):	48.35

Reference	Applic. Vel (fps)	Applic. Dep (ft)	Suggested Values
Churchill	1.5 – 6	2 - 50	11.60
O'Connor and Dobbins	.1 - 1.5	2 - 50	12.96
Owens	.1 – 6	1 - 2	21.60
Tsivoglou-Wallace	.1 – 6	.1 - 2	48.35

4. BOD DECAY RATE (Base e) AT 20 deg C (day^-1): 3.33

Reference	Suggested Value
Wright and McDonnell, 1979	3.33

OUTPUT	
1. INITIAL MIXED RIVER CONDITION	
CBOD5 (mg/L):	6.4
NBOD (mg/L):	0.1
Dissolved Oxygen (mg/L):	8.7
Temperature (deg C):	20.0
2. TEMPERATURE ADJUSTED RATE CONSTANTS (Base e)	
Reaeration (day^-1):	48.35
BOD Decay (day^-1):	3.33
3. CALCULATED INITIAL ULTIMATE CBODU AND TOTAL BODU	
Initial Mixed CBODU (mg/L):	9.4
Initial Mixed Total BODU (CBODU + NBOD, mg/L):	9.6
4. INITIAL DISSOLVED OXYGEN DEFICIT	
Saturation Dissolved Oxygen (mg/L):	8.595
Initial Deficit (mg/L):	-0.07
5. TRAVEL TIME TO CRITICAL DO CONCENTRATION (days):	0.06
6. DISTANCE TO CRITICAL DO CONCENTRATION (miles):	1.00
7. CRITICAL DO DEFICIT (mg/L):	0.54
8. CRITICAL DO CONCENTRATION (mg/L):	8.06

pH

BPJ suggests that this parameter shall be maintained in the range of 6 to 9, the water quality criterion level as specified for Class A waters in Chapter 173-201A WAC.

Total chloride

BPJ suggests that total chloride be restricted to a maximum of 230.0 mg/L, which is the chronic, most restrictive, maximum limit specified for Class A waters in Chapter 173-201A WAC. Given the biased case stream flow / discharge volume scenario as described in the BOD_5 discussion, BPJ suggests this limit will be protective of background water quality.

Total residual chlorine (TRC)

BPJ suggests that this parameter should be restricted to a maximum of 0.011 mg/L. This represents the chronic, most restrictive, maximum limit for this parameter under the State's surface water quality standards specified for Class A waters in Chapter 173-201A WAC. Due to the lack of a reasonably priced field test kit which can detect total residual chlorine to this level, the established Quantitation Level (analytical detection limit), when using the DPD/colorimeter test method, 40 CFR Part 136, of 0.05 mg/L, shall serve as the enforceable limit for this parameter. A measured value between 0.011 and 0.05 mg/L may not be a violation due to the uncertainty of the test method, and shall be reported as "NQ or Non-Quantifiable". Given the biased case stream flow / discharge volume scenario as described in the BOD_5 discussion, BPJ suggests this limit will be protective of background water quality.

TSS

BPJ suggests that the secondary treatment standards be used to limit this parameter to a maximum of 30.0 mg/L, which should be easily attainable. This limit is intended to protect human health and any other beneficial use of surface waters based on secondary treatment standards. Given the biased stream flow / discharge volume scenario as described in the BOD_5 discussion and the nature of TSS associated with fruit packing wastewater, which is generally fairly large particle size, BPJ suggests that typical fruit packing wastewater with a TSS of 30 mg/l would not exceed the water quality standard of no more than 5 NTU increase in turbidity over background.

Temperature

The first permit did not require monitoring for temperature. This permit will require quarterly temperature effluent monitoring to provide data to do a reasonable potential determination. BPJ suggests that, given the relative effluent to receiving water volumes, current discharges will be protective of background water quality for temperature. To support this a biased scenario was analyzed. Currently, 90% of the surface water discharges are reported as being 0.1 cfs or less. All discharges greater than .1 cfs discharge to large flow receiving waters such as the Columbia or Yakima Rivers. The maximum discharge reported is 0.4 cfs. Using a biased case scenario with an effluent temperature of 30˚C, a receiving water temperature of 18˚C, a small receiving water flow of 20 cfs, and an effluent volume of 0.4 cfs, a theoretical increase in the receiving water temperature can be calculated using the formula.

REC. WATER TEMP INCREASE (°C) $= RT - ((EV \times ET) + (RV \times RT)) / (EV + RV)$

$= 18.0 - ((0.4 \times 30) + (20 \times 18)) / (0.4 + 20)$

$= 0.24$ °C

Where EV = Effluent volume (cfs) RV = Receiving water volume (cfs)
ET = Effluent temperature (°C) RT = Receiving water temperature (°C)

The 0.24°C increase is less than the criteria of no increase greater than 0.3˚C due to man made causes. BPJ suggests the effluent limit and BMPs along with the relative size of the effluent and

receiving water volumes will be protective of background water quality. Those facilities that discharge water at temperatures greater than the water quality criteria to a 303(d) listed water body for temperature must either meet the criteria, select an alternative TDM, or apply for an individual permit.

Numerical Criteria for the Protection of Human Health

The U.S. EPA has promulgated 91 numeric water quality criteria for the protection of human health that are applicable to Washington State (EPA 1992). These criteria are designed to protect humans from cancer and other disease and are primarily applicable to fish and shellfish consumption and drinking water from surface waters. The Department has determined that surface water discharges from the industry are unlikely to contain chemicals regulated for human health because the only allowed surface water discharges are: 1) float tank, flume, or packing line wastewater containing either no chemical additives at all, or only chlorine-based fungicides, or 2) NCCW containing no priority pollutants, dangerous wastes, or toxics in toxic amounts.

Narrative Criteria and WET Testing

In addition to numerical criteria, "narrative" water quality criteria (WAC 173-201A-030) limit toxic, radioactive, or deleterious material concentrations below those which have the potential to adversely affect characteristic water uses, cause acute or chronic toxicity to biota, impair aesthetic values by the presence of materials or their effects which offend the senses of sight, smell, touch, or taste, or adversely affect human health. Narrative criteria protect the specific beneficial uses of all fresh waters in the State of Washington.

The only discharges allowed by this permit to surface waters which have the potential to cause toxicity are NCCW containing chemical additives. The latest USEPA NPDES Permit Writers Manual (EPA-833-B-96-003) specifies that narrative toxicity criteria should be confirmed using Whole Effluent Toxicity (WET) testing. WET testing will be done on the surface water discharges of process water and NCCW with chemical additives to verify they are not toxic. Currently there are approximately 23 facilities with surface water discharges of NCCW containing chemical additives.

- Each facility with a surface water discharge of NCCW containing chemical additives shall, within one year of receiving coverage under this permit, and within 3 months of any changes in chemical additives, submit to the department results of rapid screening WET testing for both acute and chronic toxicity, as specified in the table below. Results shall be submitted on a form which is specifically prescribed by the Department for this permit.

Any facility which fails the rapid screening test and wishes to continue to discharge NCCW containing chemical additives to surface waters, shall apply for coverage under an individual NPDES permit. If a facility with an individual permit meets the requirements of Chapter 173-205 WAC for attainment of the WET performance standard it may re-apply for coverage under the general permit.

WET Testing Requirements

	ACUTE	CHRONIC
TEST METHOD	ASTM E 1440-91, 24 hour	Snell, Terry W. 1992. A 2-d Life Cycle Test With The Rotifer *Brachionus calyciflorus*. Environmental Toxicology and Chemistry. 11:1249-1257.
SAMPLE TYPE	Grab sample to be taken at a time when the chemical additive concentrations are at a maximum level in the discharge (i.e. immediately following a slug-load chemical addition).	
TEST SPECIES	Rotifer:*Brachionus calyciflorus*	
TEST FREQUENCY	Twice within first year of permit coverage	
PERFORMANCE STANDARD **(DEFINITION OF "PASS")**	Median survival in one hundred percent (100%) effluent being equal to or greater than eighty percent (80%) And No individual test result showing less than sixty-five percent (65%) survival in one hundred percent (100%) effluent.	No chronic toxicity test demonstrating a statistically significant difference in response between the control and a test concentration equal to the acute critical effluent concentration (ACEC). Where no zone of acute criteria exceedance is allowed, as in the case with this general permit, the (ACEC) shall be one hundred percent (100%) effluent.

OTHER PERMIT CONDITIONS

REPORTING AND RECORDKEEPING

The conditions of S6. are based on the authority to specify any appropriate reporting and recordkeeping requirements to prevent and control waste discharges (WAC 173-226-090).

LAB ACCREDITATION

With the exception of certain parameters the permit requires all monitoring data to be prepared by a laboratory registered or accredited under the provisions of Chapter 173-50 WAC, *Accreditation of Environmental Laboratories*.

ENVIRONMENTAL COMPLIANCE PLAN

In accordance with state and federal regulations, each facility receiving coverage under this general permit shall develop and retain on-site, an environmental compliance plan with the following four sections:

1. Treatment / Disposal Method Operating Plan – In accordance with state and federal regulations, the permittee is required to take all reasonable steps to properly operate and maintain the treatment system (40 CFR 122.41(e) and WAC 173-226-080).
2. Solid Waste Management Plan - The Department has determined that the permittee has a potential to cause pollution of waters of the state from leachate of solid waste. This permit requires, under authority of RCW 90.48.080, that the permittee develop or update and implement a solid waste plan designed to prevent solid waste from causing pollution of the waters of the state.
3. Spill Prevention Plan – The Department has determined that the industry stores a quantity of chemicals that have the potential to cause water pollution if accidentally released. The department has the authority to require the permittee to develop best management plans to prevent this accidental release under section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080. This permit requires the permittee to develop or update and implement the plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs.
4. Stormwater Pollution Prevention Plan - The Department has determined that the permittee has a potential to cause pollution of waters of the state from stormwater. This permit requires, under authority of CWA 402(p) and RCW 90.48.080, that the permittee develop or update and implement a stormwater pollution prevention plan designed to prevent stormwater from causing pollution of the waters of the state.

ECONOMIC IMPACT ANALYSIS

The department has determined that the changes made in this permit will not result in a significant change in the economic impact on the industry from the previous permit. There are five changes which may impact costs to those facilities affected by that change, as summarized in the table below. Change 1 is the only one which will increase costs. The facilities affected by Change 1 are a subset of those affected by Change 2. Therefore the savings afforded by Change 2 will more than offset any other increased costs. No new economic impact analysis was done, beyond that covered in this section.

Summary of the Economic Impact of Permit Changes

Proposed Change	Expected Cost Impact	Costs Impact ($ / 5-year permit cycle)
1. WET testing for surface water discharges of NCCW containing additives	Increase monitoring costs	400 – 550
2. Reduce monitoring frequency of NCCW to surface water discharges.	Reduce monitoring costs	3000 – 4500
3. Replace drencher wastewater total chloride monitoring with Best Management Practices	Reduce monitoring costs	250
4. Reduce drencher wastewater monitoring frequency to once per season	Reduce monitoring costs	500
5. Extend permit coverage to facilities on Colville Tribal Land	Reduce annual fees	30% annual fee reduction

PERMIT MODIFICATIONS

The Department may modify this permit to impose new or modified numerical limitations, if necessary to meet Water Quality Standards for Surface Waters, Sediment Quality Standards, or Water Quality Standards for Ground Waters, based on new information obtained from sources such as inspections, effluent monitoring, or Department approved engineering reports. The Department may also modify this permit as a result of new or amended state or federal regulations.

PROCEDURE FOR CONDITIONAL APPROVAL FOR THE DISCHARGE OF WASTEWATER CONTAINING PRODUCTS NOT SPECIFIED IN THE CURRENT PERMIT

The industry indicated that they might lose the use of some fungicides in the current EPA re-registration process and were concerned about the length of time necessary to do a permit modification to allow the use of a new product. In response to this concern a procedure will be developed to allow conditional use of a new product until the next permit renewal. This procedure will require the industry to submit for the Departments approval an engineering report. This engineering report must contain 1) verification that the new product will meet the specified

general conditions and prohibitions, 2) contain certain specified information about the product and its environmental fate, and 3) specify a monitoring plan to verify performance. Based upon the information in the engineering report the Department with either grant or deny conditional approval for the discharge of wastewater containing the new product. Effluent limits, allowed TDMs, and BMPs will be established according to specified criteria. Based upon the results of the performance monitoring final approval will either be given or denied at the next permit reissuance.

WHEN FACILITIES MUST BE IN COMPLIANCE

Existing facilities, upon receiving coverage and lasting through the expiration date of the general permit, shall be in complete compliance with all terms and conditions. New facilities, prior to the commencement of discharge operations and lasting through the expiration date of the general permit, shall be in complete compliance with all terms and conditions.

WHEN COVERAGE IS EFFECTIVE

Unless the Department either desires to respond in writing to any facility's Application for Coverage or obtains relevant written public comment, coverage under this general permit of such a facility will commence on the later of the following:

- The thirty-first (31st) day following receipt by the Department of a completed and approved Application for Coverage;
- The thirty-first (31st) day following the end of a thirty (30) day public comment period; or
- The effective date of the general permit.

If the Department desires to respond in writing to any facility's Application for Coverage or obtains relevant written public comment, coverage under this general permit of such a facility will not commence until the Department is satisfied with the results obtained from written correspondence with the individual facility and/or the public commentor.

PESTICIDES

The Department has established, and will enforce, limits and conditions expressed in the general permit for the discharge of wastestreams containing various pesticides registered for use by the EPA and the Washington State Department of Agriculture. These agencies will enforce the use, storage and disposal requirements expressed on pesticide labels. The Permittee must comply with both the pesticide label requirements and the general permit conditions. The general permit does not supersede or preempt Federal or State label requirements or any other applicable laws and regulations. General permit Condition G15 reminds the Permittee of this fact.

HAULED DISCHARGES

If any discharges are hauled off-site, the Permittee shall be primarily responsible for assuring that those discharges are disposed of in strict compliance with all appropriate TDMs, limits,

BMPs, and any other terms or conditions of the general permit. The Permittee shall be solely responsible for assuring that any hauler is made aware of all appropriate requirements of the general permit regarding any discharge which the hauler will be disposing. The Permittee's responsibilities concerning appropriate treatment/disposal of any discharge shall exist in all situations, even when the hauler/disposer is a contracted agent. A contracted agent shall be secondarily responsible for assuring that any discharges hauled to off-site locations are disposed of in strict compliance with any appropriate TDM, limit, BMP, or any other term or condition of the general permit.

Specifically when a contracted agent is used, the Permittee shall retain on-site a written contract, properly dated and signed by both parties (Permittee and contracted agent) prior to hauling any discharge. The written contract shall include, at a minimum, the following:

1. The name, address, and telephone number of the contracted agent;
2. The dates, or time period, for which the contract shall be valid;
3. The final discharge location of any hauled discharges;
4. A statement that both parties are fully aware and agree to fully comply with their responsibilities as given above; and
5. Dates and signatures of both parties.

GENERAL CONDITIONS

General Conditions are based directly on State and Federal law and regulations.

RECOMMENDATION FOR PERMIT ISSUANCE

The general permit meets all statutory requirements for authorizing a wastewater discharge, including those limitations and conditions believed necessary to control toxics, protect human health, aquatic life, and the beneficial uses of waters of the State of Washington. The Department proposes that the general permit be issued for five (5) years.

REFERENCES

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5. Esvelt LA, and Hart H., "The Health Effect Potential of Reusing Fruit Processing Wastewater", EPA HERL Cincinnati, May 1984.
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7. Internal Departmental memo from Margaret Stinson (Manchester Lab) to Kim Sherwood, December 5, 1988.
8. Vucenta, Jasenka et al., "Investigation into Effluent Discharges from Washington Fresh Apple Packers", Volume 1, USEPA Contract No. 68-03-2578, September 1980, 110 pg.
9. "Apple, Citrus and Potato Processing Segment of the Canned and Preserved Fruits and Vegetables Point Source Category", EPA-440/1-74-027, March 1974.
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11. Spotts RA, "Use of Ozone for Decay Control", Proceedings of the 7th Annual Washington Tree Fruit Postharvest Conference, March 27 and 28, 1991.
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13. Wendt CW et. al., "Effects of Irrigation Methods on Groundwater Pollution by Nitrates and Other Solutes"., EPA-600/2-76-291, December 1976.
15. ITT Rayonier Inc., "Environmental Effects of Applying Lignosulfonates to Roads", Rayonier Chemical Products Update, May 1989.
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19. Mohamed S. Abdel-Rahman, "Pharmacokinetics of Chlorine Obtained from Chlorine Dioxide, Chlorine, Chloramine, and Chloride", Proceedings of the Fifth Conference on Water Chlorination: Environmental Impact and Health Effects, Williamsburg, Virginia, June 3-8, 1984.
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21. W.J. Masschelein, "Chlorine Dioxide: Chemistry and Environmental Impact of Oxychlorine Compounds", 190 pgs., 1979.
22. R.G. Roberts, "The Potential Use of Chlorine Dioxide as a Postharvest Tool for the Pacific Northwest Fruit Industry", Proceedings of the 5th Annual Warehouse Seminar and Trade Show, Wenatchee, Washington, March 28-29, 1989.
23. Internal Departmental memo from Jim Pearson (CRO/HWTR) to Steve Huber (CRO/WQ), “Designation of “Pear Float””, June 15, 1998.
24. Information packet received 10-30-98 from Lucie Grant, Director of Technical Operations, EcoScience, PO Box 3228, Orlando, Florida, 32802. (407) 872-2224.

25. Statement of Basis for the NPDES General Permit to Discharge Non-contact Cooling Water Into the Waters of the State of New Jersey, NPDES Permit No. NJ0070203, State of New Jersey, Department of Environmental Protection and Energy, Division of Water Quality, Wastewater Facilities Regulation Program, 401 East State Street, CN-209, Trenton, New Jersey, 08625.
26. Guidelines for Preparation of Engineering Reports for Industrial Wastewater Land Application Systems, Washington State Department of Ecology Publication #93-36, May 1993.
27. Standard Methods for the Examination of Water and Wastewater, 18th Edition, 1992.

APPENDIX A -- PUBLIC INVOLVEMENT INFORMATION

The Department has tentatively determined to reissue this general permit for the fresh fruit packing industry. The permit contains conditions and effluent limitations which are described in the rest of this fact sheet.

The Department will publish a Public Notice of Draft (PNOD) on February 17, 1999 in the State Register and the legal sections of the Yakima Herald-Republic and the Wenatchee World to inform the public that a draft permit and fact sheet are available for review. Interested persons are invited to submit written comments regarding the draft permit. The draft permit, fact sheet, and related documents are available for inspection and copying between the hours of 8:00 a.m. and 5:00 p.m. weekdays, by appointment, at the regional office listed below. Written comments should be mailed to:

General Permit Manager
Department of Ecology
Central Regional Office
15 West Yakima Avenue, Suite 200
Yakima, Washington 98902

Any interested party may comment on the draft permit to the address above. Two (2) public hearings on the draft Fresh Fruit Packing General Permit will be held at least thirty (30) days after the date of the public notice. The first hearing will be held in the in the city of Yakima at the Department of Ecology Central Regional Office, 15 West Yakima Avenue, on March 23, 1999 at 4 p.m. The second hearing will be held in the Wenatchee Public Library on March 25, 1999 at 4 p.m.

Comments should reference specific text followed by proposed modification or concern when possible. Comments may address technical issues, accuracy and completeness of information, the scope of the facility's proposed coverage, adequacy of environmental protection, permit conditions, or any other concern that would result from issuance of this permit.

The Department will consider all comments received within thirty (30) days from the date of public notice of draft indicated above, in formulating a final determination to issue, revise, or deny the permit. The Department's response to all significant comments is available upon request and will be mailed directly to people expressing an interest in this permit.

Further information may be obtained from the Department by telephone, (509) 454-7298 or by writing to the address listed above.

The original permit and fact sheet were written by Greg Bohn. This update version of the permit and fact sheet was written by Steven Huber.

APPENDIX B -- TECHNICAL CALCULATIONS

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found on the Department's homepage at http://www.wa.gov.ecology.

APPENDIX C -- GLOSSARY

DEFINITIONS

"Administrator" means the administrator of the EPA.

"Antidegradation Policy" is as stated in WAC 173-201A-070.

"Authorized representative" means:

1. If the entity is a corporation, the president, secretary, treasurer, or a vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operation facilities, if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

2. If the entity is a partnership or sole proprietorship, a general partner or proprietor, respectively; and

3. If the entity is a federal, state or local governmental facility, a director or the highest official appointed or designated to oversee the operation and performance of the activities of the government facility, or his/her designee.

The individuals described in paragraphs 1 through 3, above, may designate another authorized representative if the authorization is in writing, the authorization specifies the individual or position responsible, and the written authorization is submitted to the Department.

"Best management practices (BMPs)" means schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the State and their sediments. BMPs also include, but are not limited to, treatment requirements, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage.

"Biochemical oxygen demand (BOD_5)" means the quantity of oxygen required for aerobic bacteria to oxidize the organic decomposable matter in water under standard laboratory procedures in five (5) days at twenty degrees Centigrade (20°C), expressed in milligrams per liter (mg/L). An index to the degree of organic pollution in water.

"Bypass" means the intentional diversion of waste streams from any portion of a treatment (pollution control) facility or system.

"Capital improvements" means the following improvements which will require capital expenditures:

1. Manufacturing modifications including, but not limited to, process changes for source reduction;

2. Treatment BMPs including, but not limited to, the following:

   A. Biofiltration systems including constructed wetlands;
   B. Settling basins;
   C. Oil separation equipment; and
   D. Detention and retention basins.

3. Roofs and appropriate covers for manufacturing areas; and

4. Concrete pads and dikes with appropriate pumping for collection of storm water and transfer to control systems, from manufacturing areas.

"Code of Federal Regulations (CFR)" means a codification of the general and permanent rules published in the Federal Register by the Executive departments and agencies of the Federal Government. Environmental regulations are in Title 40.

"Color" means the optical density at the visual wave length of maximum absorption, relative to distilled water. One hundred percent (100%) transmittance is equivalent to zero (0.0) optical density.

"Combined sewer" means a sewer which has been designed to serve as both a sanitary sewer and a storm sewer, and into which infiltration is allowed.

"Combined waste treatment facility" means a "publicly owned treatment works" in which the maximum monthly average influent from any one industrial category, or categories producing similar wastes, constitutes over eighty-five percent (85%) of the design load for BOD_5 or total suspended solids (TSS). Each single industrial category must contribute a minimum of ten percent (10%) of the applicable load.

"Composite sample" means the combined mixture of not less than four (4) "discrete samples" taken at selected intervals based on an increment of either flow or time. Volatile pollutant discrete samples must be combined in the laboratory immediately prior to analysis. Each discrete sample shall be of not less than 200 ml and shall be collected and stored in accordance with procedures prescribed in the most recent edition of Standard Methods for Examination of Water and Wastewater[27].

"Conveyance" means a mechanism for transporting water or wastewater from one location to another location including, but not limited to, pipes, ditches, and channels.

"Daily maximum" means the greatest allowable value for any calendar day.

"Daily minimum" means the smallest allowable value for any calendar day.

"Dangerous waste" means the full universe of wastes regulated by Chapter 173-303 WAC, including hazardous waste.

"Degrees C" means temperature measured in degrees Celsius.

"Degrees F" means temperature measured in degrees Fahrenheit.

"Department" means the Washington State Department of Ecology.

"Detention" means the collection of water into a temporary storage device with the subsequent release of water either at a rate slower than the collection rate, or after a specified time period has passed since the time of collection.

"Director" means the director of the Washington State Department of Ecology or his/her authorized representative.

"Discharger" means an owner or operator of any "facility", "operation", or activity subject to regulation under Chapter 90.48 RCW.

"Discrete sample" means an individual sample which is collected from a wastestream on a one-time basis without consideration to flow or time, except that aliquot collection time should not exceed fifteen (15) minutes in duration.

"Effluent limitation" means any restriction established by the local government, the Department, and EPA on quantities, rates, and concentrations of chemical, physical, biological, and/or other effluent constituents which are discharged from point sources to any site including, but not limited to, waters of the state.

"Environmental Protection Agency (EPA)" means the U.S. Environmental Protection Agency or, where appropriate, the term may also be used as a designation for a duly authorized official of said agency.

"Erosion" means the wearing away of the land surface by movements of water, wind, ice, or other agents including, but not limited to, such geological processes as gravitational creep.

"Existing operation" means an operation which commenced activities resulting in a discharge, or potential discharge, to waters of the state prior to the effective date of the general permit for which a request for coverage is made.

"Facility" means the actual individual premises owned or operated by a "discharger" where process or industrial wastewater is discharged.

"Freeboard" means the vertical distance between the uppermost horizontal surface level of a lagoon's contents and the lowermost horizontal surface level of its dike's crown.

"FWPCA" means the Federal Water Pollution Control Act (33 U.S.C. 1251 et seq.), as now or as it may be amended.

"General permit" means a permit which covers multiple dischargers of a point source category within a designated geographical area, in lieu of individual permits being issued to each discharger.

"Gpd" means gallons per day.

"Grab sample" is synonymous with "discrete sample".

"Ground water" means any natural occurring water in a saturated zone or stratum beneath the surface or land or a surface water body.

Hazardous waste" means those wastes designated by 40 CFR Part 261, and regulated by the EPA.

"Individual permit" means a discharge permit for a single point source or a single facility.

"Industrial wastewater" means water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business, from the development of any natural resource, or from animal operations such as feedlots, poultry house, or dairies. The term includes contaminated storm water and also, leachate from solid waste facilities.

"Interference" means a discharge by an industrial user which, alone or in conjunction with or discharges by other sources, inhibits or disrupts the POTW or private wastewater disposal system, its treatment processes or operations, or its sludge processes, use or disposal and which is a cause of violation of any requirement of any NPDES or State discharge permit including an increase in the magnitude or duration of a violation or any increase in the cost of treatment of sewage or in the cost of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent state or local regulations): section 405 of the FWPCA (33 U.S.C. 1251 et seq.); the Solid Waste Disposal Act (SWDA), including Title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA) (42 U.S.C. 6901 et seq.); and any state regulations contained in any state sludge management plan prepared pursuant to Subtitle D of the SWDA, the Clean Air Act (42 U.S.C. 7401 et seq.), the Toxic Control Act (TSCA) (15 U.S.C. 2601 et seq.), and the Marine Protection, Research and Sanctuaries Act (33 U.S.C. 1401 et seq.).

"Landfill" means an area of land or an excavation in which wastes are placed for permanent or temporary disposal, and which is not a land application site, dust abatement site, surface impoundment, injection well, or waste pile.

"Leachate" means any liquid that has percolated through soil and contains substances in solution or suspension.

"Liner" means an HDPE (or equivalent) geomembrane material with a thickness specifically engineered, but at least 30-mils, to withstand internal and external pressure gradients, physical contact with wastes, climatic conditions, and stresses of installation and daily operation. For the purposes of this general permit, only geomembrane liners are acceptable.

"May" is permissive.

"Mg/L" means milligrams per liter and is equivalent to parts per million (ppm).

"Monthly average" means that value determined by the summation of the instantaneous measurements during any single month divided by the number of instantaneous measurements collected during that same single month.

"Municipal sewerage system" means a publicly owned domestic wastewater facility or a privately owned domestic wastewater facility that is under contract to a municipality.

"New operation" means an operation which commenced activities which result in a discharge, or a potential discharge, to waters of the state on or after the effective date of an applicable general permit.

"Non-contact cooling water (NCCW)" means water used for cooling which does not come into direct contact with any production site raw material, intermediate product, waste product, or finished product.

"NPDES" means the National Pollutant Discharge Elimination System under section 402 of FWPCA.

"Operation" is synonymous with "facility".

"Party" means an individual, firm, corporation, association, partnership, copartnership, consortium, company, joint venture, commercial entity, industry, private corporation, port district, special purpose district, irrigation district, trust, estate, unit of local government, state government agency, federal government agency, Indian tribe, or any other legal entity whatsoever, or their legal representatives, agents, or assignee.

"Pass through" means the discharge of pollutants through a municipal or private wastewater disposal system into waters of the state in quantities or concentrations which are a cause of a violation of or significantly contribute to a violation of any requirement of water quality standards for waters of the state, Chapter 173-201A WAC, or of the NPDES or state waste discharge permit, including an increase in the magnitude or duration of a violation (section 307 of the FWPCA). Failure to obtain approval of an application for a new or increased discharge or change in the nature of the discharge according to WAC 173-216-110(5) would constitute such a violation.

"Permit" means an authorization, license, or equivalent control document issued by the Department to implement Chapter 173-200 WAC, Chapter 173-216 WAC and/or Chapter 173-226 WAC.

"Person" is synonymous with "party".

"pH" means the logarithm of the reciprocal of the mass of hydrogen ions in grams per liter of solution. Neutral water, for example, has a pH value of 7 and a hydrogen-ion concentration of 10^{-7}. pH is a measure of a substance's corrosivity (acidity or alkalinity).

"Point source" means any discernible, confined and discrete conveyance including, but not limited to, any pipe, ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling stock, concentrated animal feeding operation, or vessel or other floating craft, from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture.

"Pollutant" means any substance discharged, if discharged directly, would alter the chemical, physical, thermal, biological, or radiological integrity of the waters of the state, or would be likely to create a nuisance or render such waters harmful, detrimental or injurious to the public health, safety or welfare, or to any legitimate beneficial use, or to any animal life, either terrestrial or aquatic. Pollutants include, but are not limited to, the following: dredged spoil, solid waste, incinerator residue, filter backwash, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, pH, temperature, TSS, turbidity, color, BOD_5, TDS, toxicity, odor and industrial, municipal, and agricultural waste.

"Pretreatment" means the reduction of the amount of pollutants, the elimination of pollutants, or the alteration of the nature of pollutant properties in wastewater to a less harmful state prior to or in lieu of discharging. This reduction or alteration can be obtained by physical, chemical or biological processes, by process changes, or by other means, except by diluting the concentration of the pollutants.

"Priority pollutant" means those substances listed in the federal 40 CFR Part 423, Appendix A, or as may be amended.

"Private wastewater disposal system" means any system of piping, treatment devices, or other facilities, including a septic tank, that convey, store, treat, or dispose of sewage on the property where it originates or on adjacent or nearby property under the control of the user where the system is not connected to a public sewer.

"Process wastewater" means water which, during manufacturing or processing, comes into direct contact with or results from the production or use of any raw material, intermediate product, finished product, by-product, or waste product.

"Publicly owned treatment works (POTW)" is synonymous with "municipal sewerage system".

"Reasonable times" means at any time during normal business hours; hours during which production, treatment, or discharge occurs; or times when the Department suspects occurrence of a violation.

"Regional administrator" means the regional administrator of Region X of the EPA or his/her authorized representative.

"Retention" means the collection of water into a permanent storage device, with no subsequent release of water.

"Sanitary sewer" means a sewer which is designed to convey sanitary sewage and into which infiltration is allowed.

"Severe property damage" means substantial physical damage to property, damage to the pretreatment facilities or treatment/disposal facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays or losses in production.

"Shall" is mandatory.

"Significant" is synonymous with "substantial".

"Significant process change" means any change in a facility's processing nature which will result in new or substantially increased discharges of pollutants or a change in the nature of the discharge of pollutants, or violate the terms and conditions of this general permit, including but not limited to, facility expansions, production increases, or process modifications.

"Site" means the land or water area where any "facility", "operation", or "activity" is physically located or conducted, including any adjacent land used in connection with such facility, operation, or activity. "Site" also means the land or water area receiving any effluent discharged from any facility, operation, or activity.

"Small business" has the meaning given in RCW 43.31.025(4).

"Standard Industrial Classification (SIC) Code" means a classification pursuant to the Standard Industrial Classification Manual issued by the U.S. Office of Management and Budget.

"State" means the State of Washington.

"Storm drain" means a sewer that is designed to convey storm water and infiltration.

"Storm sewer" is synonymous with "storm drain".

"Storm water" means any flow occurring during or following any form of natural precipitation, and resulting therefrom, including snowmelt.

"Storm water facility" means a constructed component of a storm water drainage system, designed or constructed to perform a particular function, or multiple functions. Storm water facilities include, but are not limited to, swales, ditches, culverts, street gutters, detention/retention basins, infiltration devices, oil/water separators, sediment basins, and modular pavement.

"Substantial" means any difference in any parameter including, but not limited to, the following: monitoring result, process characteristic, permit term or condition; which the Department considers to be of significant importance, value, degree, amount, or extent.

"Surface waters of the state" means all waters defined as "waters of the United States" in 40 CFR 122.2 within the geographic boundaries of the state of Washington. This includes lakes, rivers, ponds, streams, inland waters, ocean, bays, estuaries, sounds, inlets, and all other surface water and water courses including wetlands within the jurisdiction of the state of Washington.

"Total residual chlorine" means the amount of chlorine remaining in water or wastewater which is equivalent to the sum of the combined residual chlorine (non-reactive) and the free residual chlorine (reactive), expressed in mg/L.

"Total dissolved solids (TDS)" means total dissolved matter dissolved in water or wastewater, expressed in mg/L.

"Total suspended solids (TSS)" means total suspended matter that either floats on the surface of, or is in suspension in water or wastewater, expressed in mg/L.

"Toxic amounts" means any amount, i.e., concentration or volume, of a pollutant which causes, or could potentially cause, the death of, or injury to, fish, animals, vegetation or other resources of the state, or otherwise causes, or could potentially cause, a reduction in the quality of the state's waters below the standards set by the Department or, if no standards have been set, causes significant degradation of water quality, thereby damaging the same.

"Toxics" means those substances listed in the federal priority pollutant list and any other pollutant or combination of pollutants listed as toxic in regulations promulgated by the EPA under section 307 of the FWPCA (33 U.S.C. 1317 et seq.), or the Department under Chapter 173-200 WAC, Chapter 173-201A WAC, or Chapter 173-204 WAC.

"Unirrigated" means any lands having not been irrigated within 10 days prior to, or within 60 days after the application of any wastestream.

"Upset" means an exceptional incident in which a discharger unintentionally and temporarily is in a state of noncompliance with permit effluent limitations due to factors beyond the reasonable control of the discharger. An upset does not include noncompliance to the extent caused by

operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventative maintenance, or careless or improper operation thereof.

"Wastewater" means liquid-carried human wastes or a combination of liquid-carried waste from residences, business buildings, or industrial establishments.

"Waters of the state" means all waters defined as "surface waters of the state" and all waters defined as "waters of the state" in RCW 90.40.020.

"Water quality" means the chemical, physical, biological characteristics of water, usually in respect to its suitability for a particular purpose.

“Water Quality Preservation Area (WQPA)” means waters which have been designated as high quality waters based upon one or more of the following criteria:

1. Waters in designated federal and state parks, monuments, preserves, wildlife refuges, wilderness areas, marine sanctuaries, estuarine research reserves, and wild and scenic rivers;
2. Aquatic habitat having exceptional importance to one or more life stage of a candidate of listed priority species, established by the state Department of Fish & Wildlife, or a federally proposed or listed threatened or endangered species;
3. Rare aquatic habitat, ecological reference sites, or other waters having unique and exceptional ecological or recreational significance.

"Water quality standards" means the state of Washington's water quality standards for ground waters of the state (Chapter 173-200 WAC) and the state of Washington's water quality standards for surface waters of the state (Chapter 173-201A WAC).

In the absence of other definitions as set forth herein, the definitions as set forth in 40 CFR Part 403.3 shall be used for circumstances concerning the discharge of wastes.

APPENDIX D -- RESPONSE TO COMMENTS

The Public Notice of Draft was published on February 17, 1999. Public hearing were held on March 23, 1999 in Yakima, Washington and March 25, 1999 in Wenatchee, Washington. The comment period ended March 30, 1999. No testimony was given at either public hearings. US EPA waived their right to review the draft permit. Three written comments were received. These comments are summarized below along with the Ecology response.

COMMENT 1

Date Submitted: March 23, 1999
Submitted by: Dave Reed
Representing: Yakima Valley Growers & Shippers

Comment:

The process of re-issuance of the Fresh Fruit Packing Industry NPDES Waste Discharge General Permit was envisioned to be, and has proven to be, a collaborative effort of industry and the department of Ecology. The permit draft submitted for public comment reflects much of the knowledge gained and the lessons learned during the five year history of this permit. It also offers permittees a higher degree of flexibility than is afforded under the existing permit, and does so without compromising in any way the necessary protections for our state's water resources and environment. The public hearing being held today culminates 16 months of dialog between the department and industry on this permit re-issuance, and it is because of this cooperative effort that our association is in a position to support the draft under review today.

Ecology Response: None needed

COMMENT 2

Date Submitted: March 25, 1999
Submitted by: Steve Brown
Representing: Wastewater Steering Committee

Comment:

After months of effort on the part of countless individuals, the Fresh Fruit Packing General Permit is now to the public comment stage. Congratulations! The industry now has a document that recognizes and allows for the constantly evolving nature of this business. New procedures, and practices, the introduction of new chemicals and their use, better Best Management Practices (BMPs), changes in Maximum Contaminant Levels (MCLs), and different Treatment Disposal Methods (TDMs) can now be considered. The "Conditional Approval" portion of this permit provides this vehicle for change. Based on experience and date collected during the past permit cycle some MCLs, BMPs, and TDMs have been relaxed. This allows for the practical disposal of wastewater without jeopardizing the environment or public heath. As with all negotiations,

some things were given up on the process. Disposal of certain wastestreams will become more difficult. In particular, Whole Effluent Toxicity (WET) testing of the NCCW to surface water is a requirement of the proposed permit. Changes, both good and bad, are not without reason. Just like our industry, the world we live in is constantly evolving. The recognition of this and the willingness to adapt is essential to ensure the future of this industry. This may not be the "perfect" permit. It is however a document I feel the industry can live with. I hope the industry will stand behind the efforts of the wastewater renewal committee and support this permit.

Ecology Response: None needed

COMMENT 3

Date Submitted: March 30, 1999
Submitted by: Mike Sliman
Representing: Strand Apples

Comment:

Recommend the allowed "drencher water" chemical levels at discharge be re-evaluated. The allowable limits are the "Label Rates" for each product. The warehouse maintains these level rates throughout the drencher tanks cycle. The probability of the chemical level exceeding the "permit" limits are high. Recommend one of two actions: A. Permit a "chemical level" slightly above the "Label Rate". For instance, TBZ label rate is 500 mg/l; set the permit limit at 600 mg/l. B. Use a sliding scale discharge area similar to that in table 10 for Pear Float.

Ecology Response:

This permit is placing a greater emphasis on replacing some monitoring with the use of process control and best management practices to protect water quality. This means careful attention to accurate mixing procedures and the maintenance of complete mix and wastewater disposal records is essential. It is understood that there may be some small natural variation around the target concentration, but careful mixing procedures should minimize this variation. No change is needed in the proposed permit.